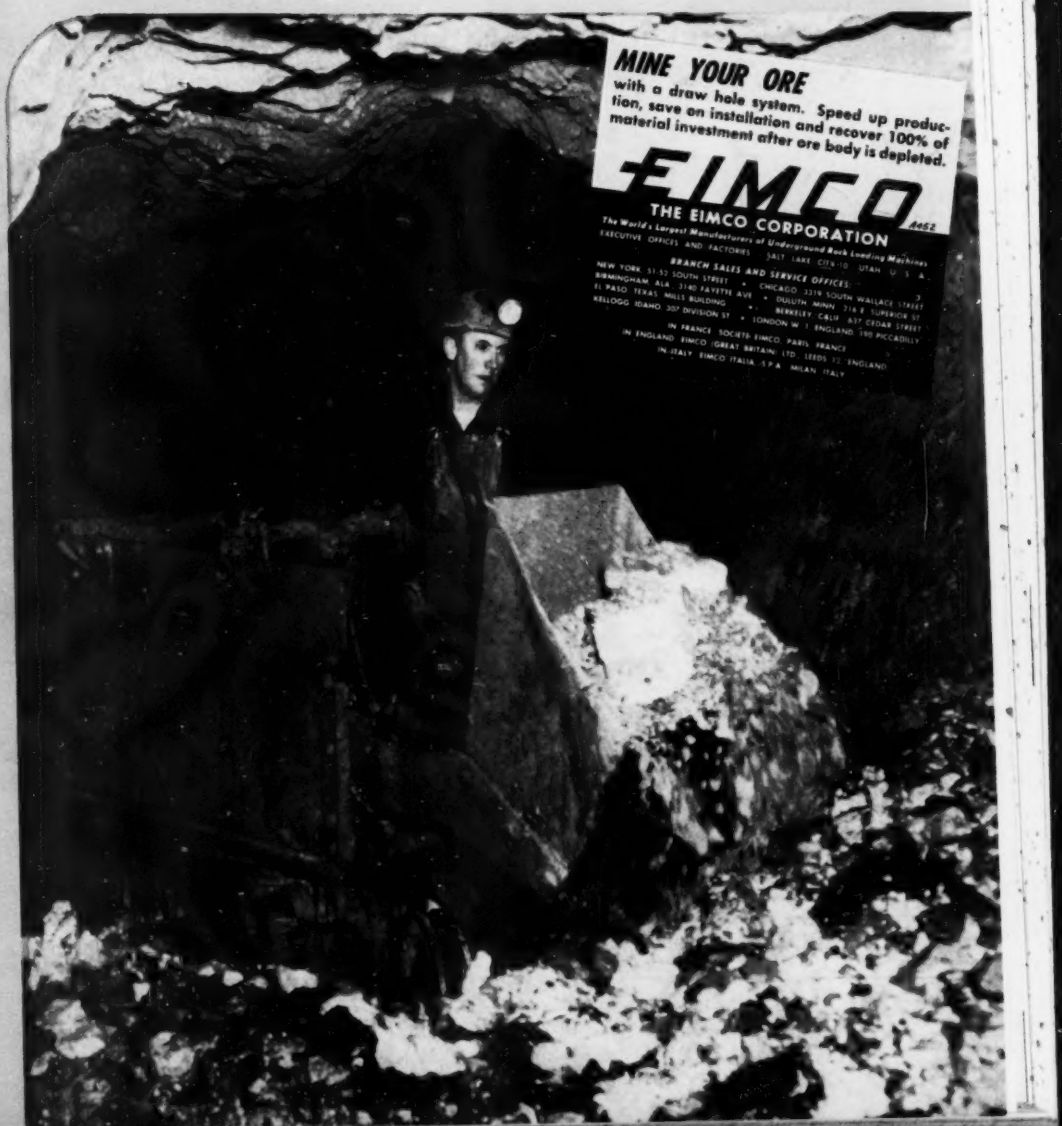
MINING WORLD

in this issue

South Dakota Uranium Review

Page 46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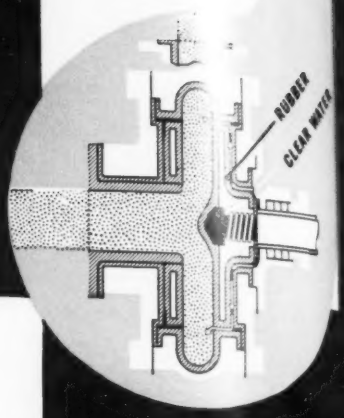
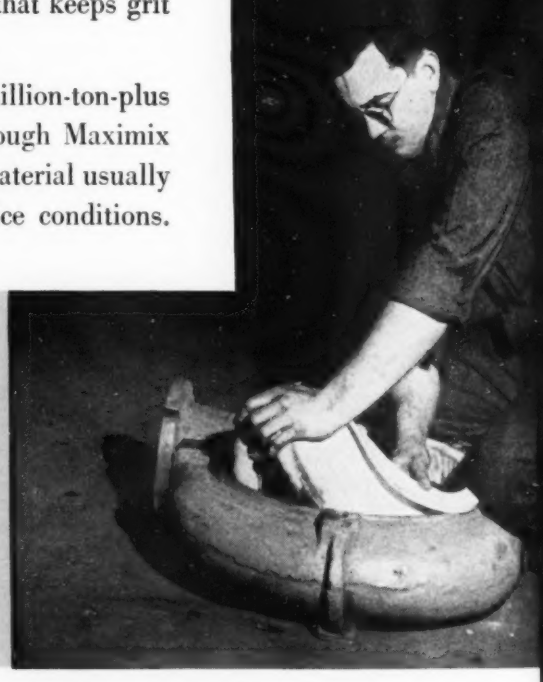
How Hydroseals cut down maintenance costs

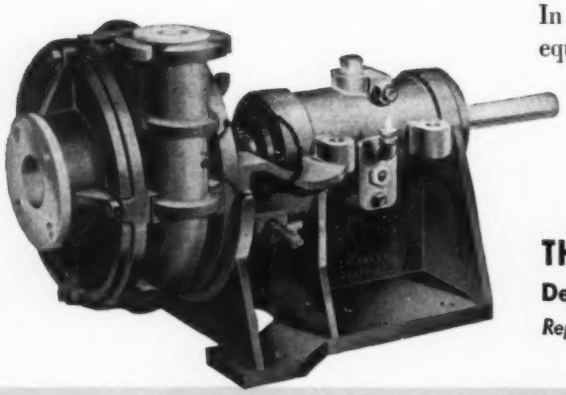


For one thing, Hydroseal Pumps need less attention than most abrasives-handling pumps. Part of the secret of their endurance is the exclusive Hydrosealing feature that keeps grit from enlarging critical clearances.

Another reason why Hydroseals often turn in million-ton-plus pumping records without repairs is the use of tough Maximix Rubber for parts in contact with abrasives. This material usually outlasts metal 4 to 6 times under similar service conditions.

When Hydroseals do need replacement parts, you can make the changes easily and quickly in the field. Shell liners, for example, are moulded so that they slip into place like the inner tube of a tire. Other parts are also designed for rapid assembly, and no cementing or vulcanizing is needed. Matching machined surfaces give a positive means for fast, accurate reassembly. This all adds up to less downtime.





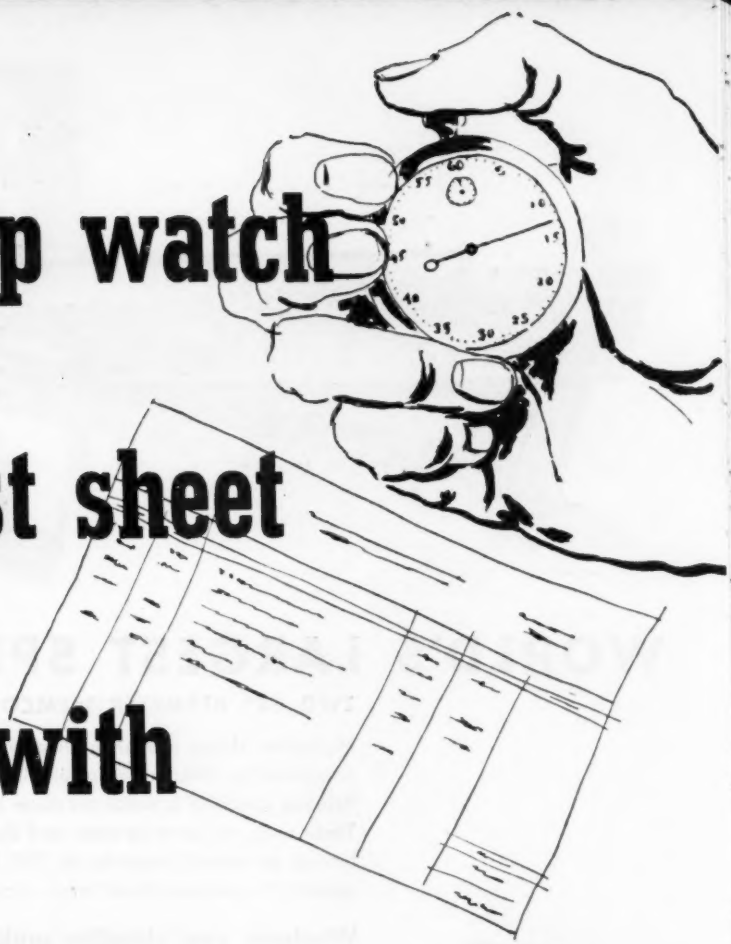
In addition, Maximix Rubber Parts cost less than equivalent metal parts. They also weigh 80% less, and are thus easier to handle and cheaper to ship. If you want to cut pumping costs, find out more about Hydroseals. Write today for our latest catalog.

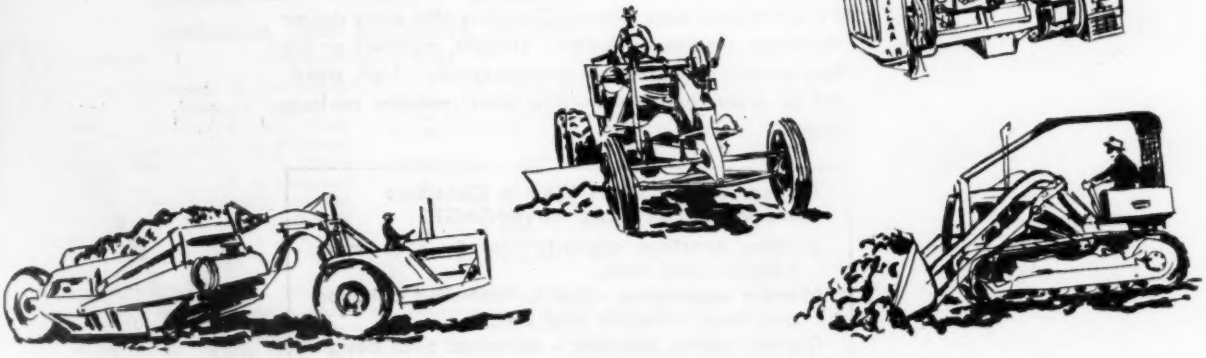
THE ALLEN-SHERMAN-HOFF PUMP CO.
Dept. J—259 E. Lancaster Ave., Wynnewood, Pa.
Representatives throughout the World

HYDROSEAL SAND, SLURRY & DREDGE PUMPS
MAXIMIX RUBBER PROTECTED

HYDROSEAL PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD

Use your stop watch and your cost sheet on your job with CAT* equipment





THERE'S one way to find out whether you're making all the profit you're entitled to. Get out your stop watch and cost sheets. Tally your cycle times and production figures. Check your down time and the resale value of your machines. These figures will convince you of Caterpillar superiority.

Your Caterpillar Dealer will give you an on-the-job demonstration. Fair enough? Call him today.

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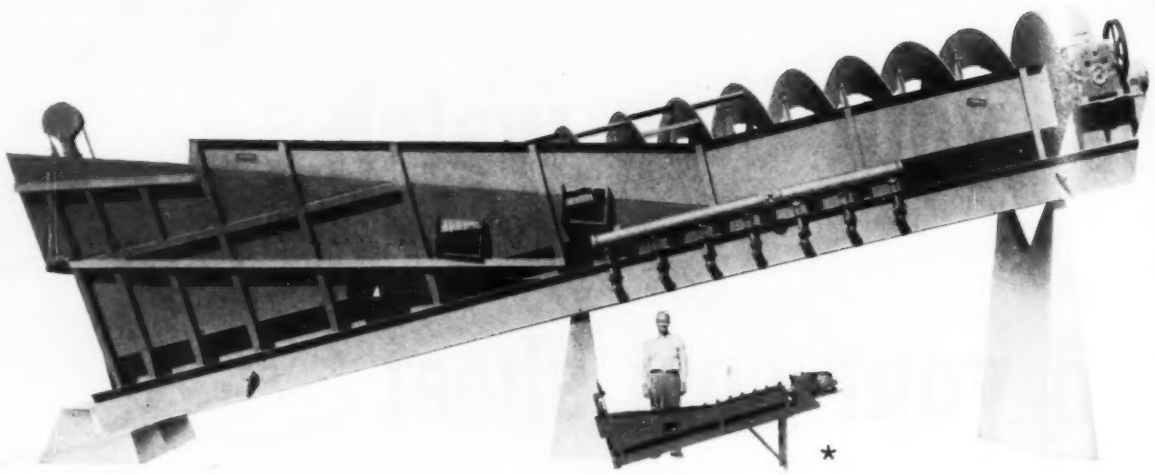

WORLD'S LARGEST SPIRAL CLASSIFIERS

TWO 84" DIAMETER WEMCO S-H CLASSIFIERS

Illustration shows one of the two large classifiers recently completed by Wemco for installation in the iron-ore beneficiation circuit of a major producer on the Mesabi Range. These units will serve to wash and deslime fines in a plant having an overall capacity of 700 LTPH. They also will operate to prepare feed for a cyclone treatment plant.

Whatever your classifier problem— WEMCO offers a model to fit your job

Whether you have a small, medium or large tonnage circuit, the exclusive design of Wemco S-H Classifiers offers flexibility to suit your particular operations. In addition to a wide range of sizes, Wemco Classifiers offer many design variations: simplex or duplex — straight, modified or full flare tanks — single, double or triple spirals — high, standard or submerged weirs — and short, medium or long lengths.

Modern Design Gives Wemco Classifiers these METALLURGICAL ADVANTAGES

Greater overflow capacity — up to 25% more effective pool area.

Sharper separation — due to controlled agitation and larger effective pool area.

Greater raking capacity — advanced pitch design provides up to 100% greater sand conveying capacity.

Balanced operation — between overflow and raking requirements.

★ Photo shows size comparison between 84" and 12" Wemco S-H Classifiers.

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THE COVER CIRCLE: The shaded area on the map indicates the location where the United States Atomic Energy Commission is now doing its first diamond drill prospecting in South Dakota. No. 13 indicates the site of the historic spot where the first discovery of uranium was made in South Dakota. Turn to page 30 for the key to the other map numbers.

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GRAB SAMPLES From the Mail

Barvue Conveyor Tubes

Dear Sir:

In your recent article on Barvue Mines a description of the fabricated conveyor housing did not note the length of these sections. I would appreciate very much having this information if it is available.

E. R. Borcherdt
Chief Research Engineer
Anaconda Copper Mining Company
Butte, Montana.

Mr. E. H. P. Hamilton, vice president of General Engineering Company, Ltd., whose company designed and built the mill says that the tubes are 108-inches inside diameter of ¼-inch steel plate with 5/16 by 3 inch ring stiffeners welded in at 96-inch centers. The longest spans or distances between flanges are 80 feet, but longer spans may be used if required. In order to facilitate handling on railroad flat cars, the tubes were shipped in 40 foot lengths and field welded together before erection. Normal joints at towers were flange bolted. Provision for expansion is made by the use of 12 gauge diaphragm plates at one or both ends of tubes and by the use of a sliding bracket at towers where necessary.—Ed.

Uis Addresses Listed

Dear Sirs:

On page 68 in the March 1953 issue you mention the fact that the Uis Tin Mining Co. (South West Africa), Ltd. is producing tantalite-columbite, beryl and lithium.

Please send us the address of the firm and oblige.

Irvin E. Behrman
Varlacoid Chemical Company
New York 4, New York.

The office in South West Africa is Liwinowski's Buildings, Windhoek. Another office is at 701 Volkskas Building, 76 Market street, Johannesburg, Union of South Africa. —Ed.

Drilling Tips Help His Work

Dear Sir:

Your November 1952 issue contains an article entitled "Drilling Tips For Diamond Bits" by Burton J. Westman, which contains information very pertinent to my work as an engineering geologist. I would appreciate your sending me two or three reprint copies of this article.

William N. Laval
Ebasco Services Incorporated
Amboy, Washington.

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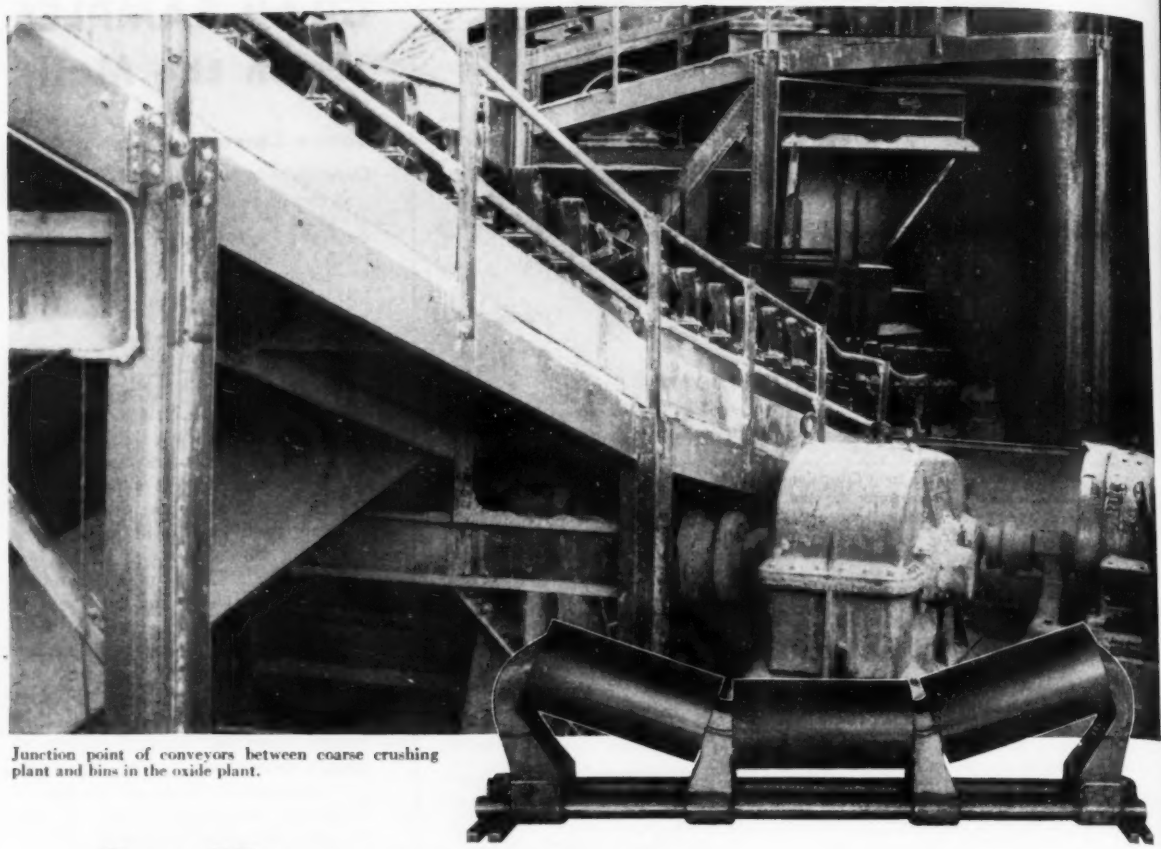
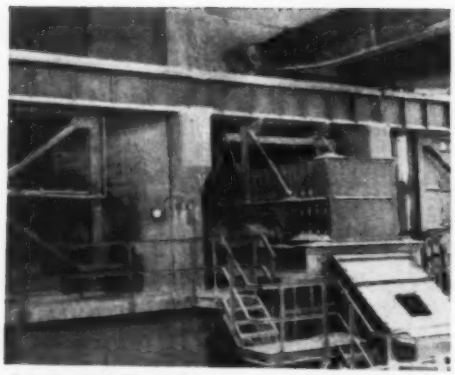


Junction point of conveyors between coarse crushing plant and bins in the oxide plant.

SIX MILES of Conveyor Belts

Ride on S-A CARRIERS at CHILE EXPLORATION CO.'s Chuquicamata Plant



S-A Amsco Feeder in the secondary crushing plant. This is one of six Amsco Feeders used at Chuquicamata.

More than 2500 of these S-A Carriers have been in service for a quarter of a century. All of this group are in the multi-million ton class—*and are still going strong!*

When the huge new sulphide plant was built—and with this record to go by—enough S-A Carriers to equip 2½ miles of new conveyor belts were installed.

Most of the Carriers used are S-A "444" Heavy Duty Carriers especially designed for maximum operating economy and long life. Their unique "tip-back" feature enables Carriers to be inspected without shutting down the conveyor. Other Carriers on the job are S-A "Mammoths," probably the largest anti-friction units ever built.

Besides its Carriers, S-A has six Amsco Feeders on the job in the crushing plant.

We at S-A feel that there could be no greater tribute to the worth of S-A equipment than to be chosen—*and chosen again 25 years later*—by Chile Exploration Co. for its Chuquicamata operation.

STEPHEN S-A DAMSON MFG. CO.

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"Eucs" haul big loads at less cost

Write for your free copy of the new book "Estimating Production and Costs of Material Movement with Euclids"... it contains helpful information for all users of off-the-highway hauling equipment.

More loads per hour and more profit per load with Euclid equipment on the job . . . that's the experience of many quarry operators, open pit mines, sand and gravel producers, and industrial users of heavy duty off-the-highway hauling units. "Eucs" consistently increase production and reduce the costs per ton or yard of material moved.

Bottom-Dump Euclids are engineered and built as complete units with weight distribution that provides better flotation and traction. With payload capacities up to 40 tons and powered by diesel engines of 190 to 300 h.p., these "Eucs" have loaded top speeds up to 34 m.p.h.

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Owners everywhere report longer service life, greater job availability and more production at less cost with Euclids. See your Euclid Distributor for a detailed job study and Euclid cost estimate for your hauling operation.

The EUCLID ROAD MACHINERY Co., CLEVELAND 17, OHIO

YOU GET MORE FOR YOUR MONEY in PACIFIC SHEAVE BLOCKS

★

TYPES AND SIZES TO SUIT EVERY MINING OPERATION

Read the pull-out captions on this cutaway view and you'll see why PACIFIC Quick-Opening Sheave Blocks offer you more for your money. Manganese steel sheaves, manganese steel side frames—work-harden for longer wear. Sheaves are kind to cable. Side plates stand up. Upkeep is nil. Load rated roller bearings for extra safety. Special grease seals. Send for Bulletin No. 238.

All blocks equipped with chained toggle pin for quick-opening.

Wide throat passes fittings, splices or square knots.

Manganese steel side frames work-harden with use. Practically impossible for cable to cut through.

Sheave rims are recessed into side frames to prevent rope fouling.

Manganese steel sheaves work-harden with use. This reduces cable wear.

Special grease seal keeps out foreign material, keeps grease in.

Roller bearings are load-rated with extra high safety factor.

Shaft and bearings assembled with positive shake-proof lock washers.

Spacer is integral part of side frame. Won't collapse against sheave, even if spacer bolt is lost.

Model CF with Hook

Model CF with Shackle

Model C with Safety Swivel Shackle

Model 6WT with Shackle

Send for Bulletin No. 238 which gives specifications on the complete line of PACIFIC Sheave Blocks. Bulletin also illustrates and describes PACIFIC Sheave Anchors.

Model C (half shroud) and Model CF (full shroud) furnished in 8″, 10″ and 12″ sizes. Available with hook, shackle or safety swivel shackle. ★ Pacific 6WT Wide Throat Carrying Block available with shackle or hook. Toggle pins included as standard equipment. ★ ALLOY also manufactures 19″ Tail Block Assemblies and 6″ Standard General Utility Blocks (not illustrated).

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Low height . . . Streamlined . . . Totally Enclosed and Permissible Types . . . Furnished complete with starters for standard power characteristics.

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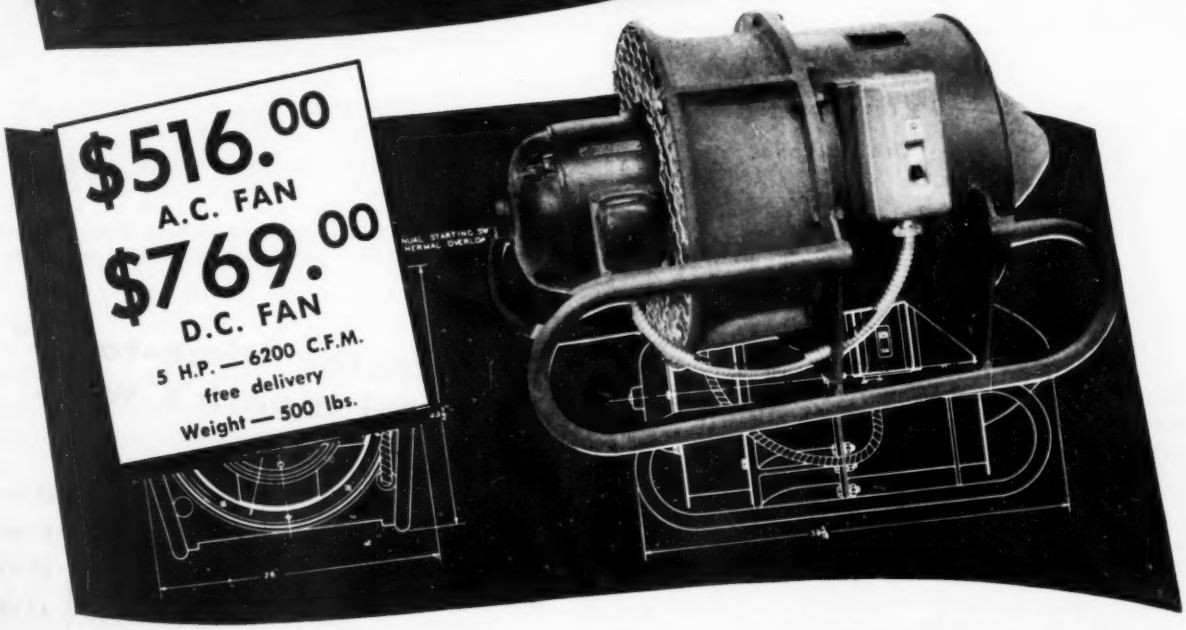

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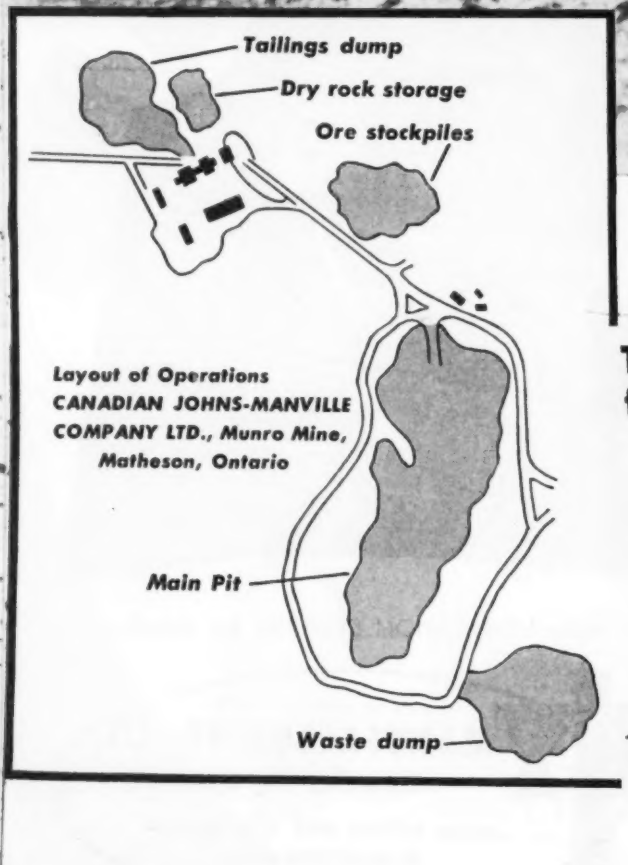
IF IT'S MINED, PROCESSED OR MOVED
. . .IT'S A JOB FOR JEFFREY!

JOHNS-MANVILLE uses To

Tournatractor cleans snow from pit floor. Note good condition of tires after 3000 hours work on abrasive, rocky materials.



Layout of Operations
CANADIAN JOHNS-MANVILLE COMPANY LTD., Munro Mine, Matheson, Ontario

Tournatractor "time-table" for typical month's work

• Dozing ore to crusher, cleaning around 4 shovels, maintaining ore stockpile	238 hrs.
• Maintaining tailings dump	87 hrs.
• Maintaining waste dump	62 hrs.
• Towing equipment	43 hrs.
• Plowing snow	62 hrs.
• Odd jobs	43 hrs.
Total working time for month	**535 hrs.**

High-speed, rubber-tired excavating • hauling

Tournatractor *on mine maintenance*

On tailings dump, "C" moves up to 3 cu. yds. per load. With big 21.00 x 25 low-pressure tires and 4-wheel drive, rig has plenty of flotation and traction in the soft, loose footing.

Canadian Johns-Manville Ltd., the world's largest asbestos producer, works a 19 mph, rubber-tired C Tournatractor on mine maintenance at their Munro open-pit near Matheson, Ontario.

Their 186 hp "C" works 24 hours per day, 6 days per week, handling scattered jobs. During a typical 24-hour period, rig maintains stockpile and dozes ore to crusher . . . cleans up for three 2½-yard shovels and one ¾-yard shovel . . . maintains tailings and waste dumps . . . clears gabro rock and wet blue clay overburden . . . tows compressors, wagon drills and other mine equipment. Unit moves from job to job without delay.

With Angledozer blade at full 20° angle, Tournatractor clears path 12' wide in one pass. Grade is 7% . . . temperature, 37° below zero. Rig often worked in temperatures of 50° below.

Plows 26 mi. of road in 6¾ hrs.

In addition to this regular mine maintenance, Tournatractor also plows snow. After one heavy snow, rig traveled 30 miles and cleared 26 miles of road in 6¾ hours! First, it opened the highway from the mine to the nearby town of Holtyre (8 miles). Then, it returned 4 miles over the same road to an intersection . . . plowed the road to Matheson (7 miles) . . . cleared city streets and company warehouse grounds there . . . and returned 11 miles to the mine, widening road it previously opened.

95% efficient over 3000 hours

At other times during the winter, the "C" plowed and maintained haul roads, helped pull shovel up steep grades on moves from pit to pit, and did odd jobs around the shop. In 3,000 working hours, Tournatractor recorded a 95% mechanical efficiency.

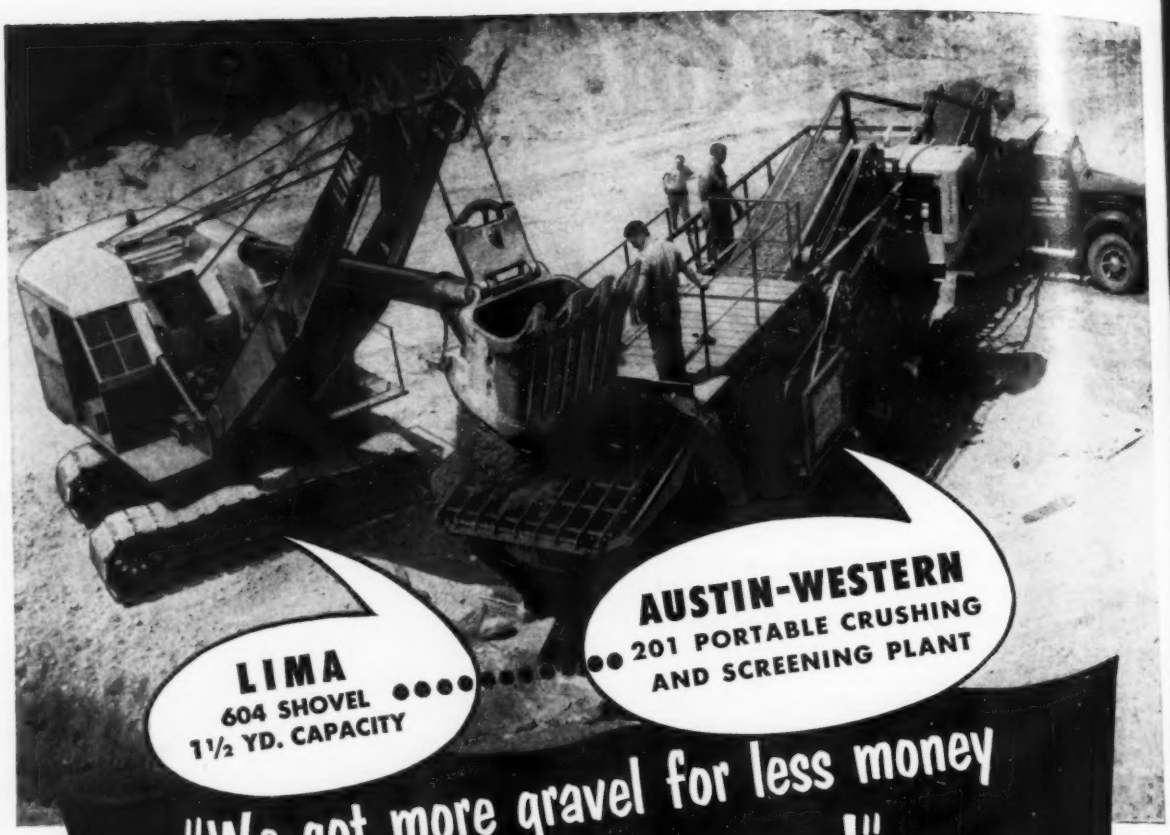
Why not find out for yourself how Tournatractor's 19 mph speeds on rubber can get more work done, at lower cost per job? Call your LeTourneau Distributor for a demonstration on your job at no obligation.

Tournatractor's ability to make self-powered moves anywhere at speeds up to 19 mph provides quick service to all parts of the Munro Mine . . . which processes 2,000 tons of rock through mill daily.

Angledozer—Trademark Reg. U. S. Pat. Off. Tournatractor—Trademark D-204-M

• lifting equipment

R. G. LeTOURNEAU, INC.
Peoria, Illinois



"We got more gravel for less money with this powerful team!"

...says CONTRACTOR FRANK ROSSI of Gardiner, Me.

"By teaming our LIMA shovel with our Austin-Western crusher, we made our own surfacing material for this new section of the Roosevelt trail . . . cutting time and costs by crushing and screening gravel on the job."

Such reports are not surprising when the teammates on the "production line" are these . . .

LIMA TYPE 604 SHOVEL—A convertible shovel (1 ½ cu. yd.), crane (30 ton) and dragline . . . very popular for road grading, quarry and gravel pit operations, and diverse construction and material handling work. Its air operated clutches and antifriction bearings guarantee smooth, quick operation. Streamlined, counter-balanced design assures you greatest capacity per pound of weight.

AUSTIN-WESTERN "201"—Portable Crushing and Screening Plant with high production and low operating cost. The "201" excels in production because of its high operating speeds and exclusive design features, oversize conveyors and extra-large screening capacity.

THERE'S A LIMA-A.W. TEAM FOR EVERY JOB! There are ***LIMA shovels*** ranging in capacity from ¾ to 6 yards, convertible to cranes with capacities up to 110 tons.

There are ***Austin-Western*** crushing plants for any requirement . . . small portable units with single crusher and screen, multiple portable units, or stationary crushing and washing plants . . . each giving you maximum production at minimum cost.

Note: Austin-Western Crushers are now being manufactured in Lima, Ohio, enabling us to maintain steady, top-quality production of crushers.

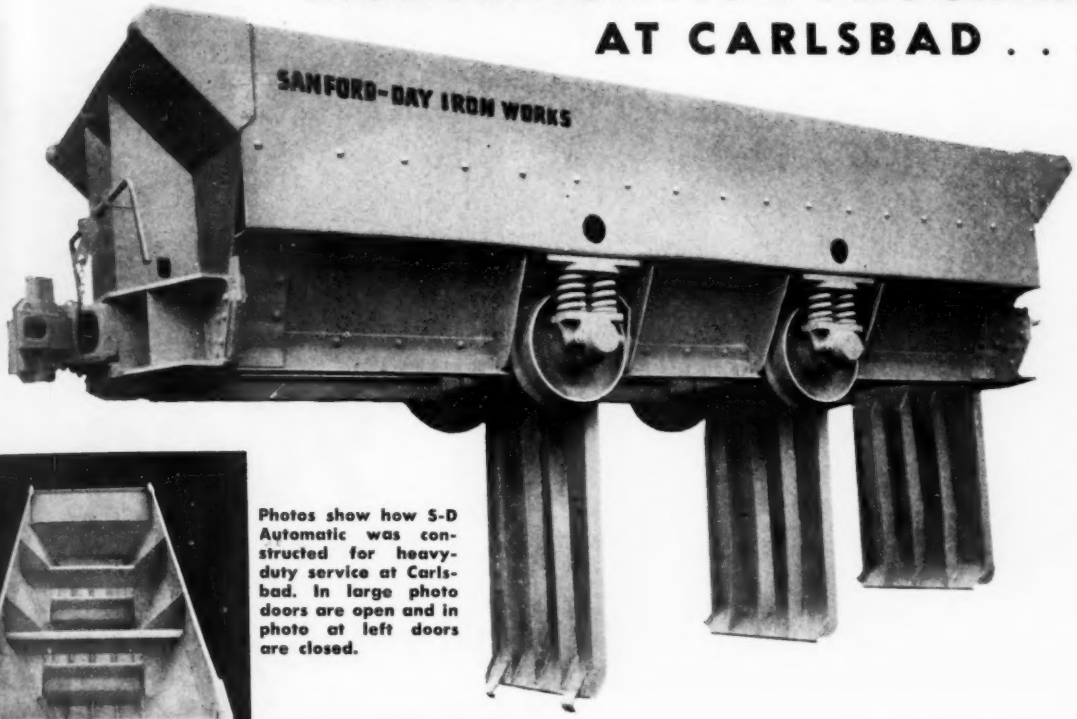
Cable Address: LIMASHOVEL

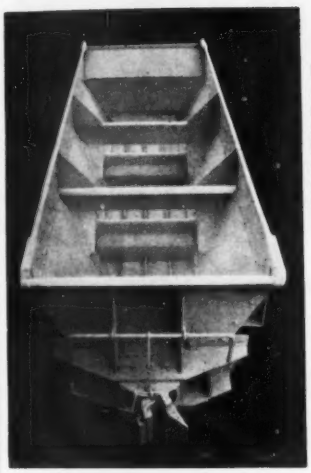
LIMA
SHOVELS • CRANES
DRAGLINES • PULLSHOVELS

BALDWIN BLH LIMA-HAMILTON
Construction Equipment Division

BALDWIN-LIMA-HAMILTON CORPORATION
Construction Equipment Division
LIMA, OHIO, U.S.A.

UNITED STATES POTASH CO. CONTINUES MODERNIZATION PROGRAM AT CARLSBAD . . .





Photos show how S-D Automatic was constructed for heavy-duty service at Carlsbad. In large photo doors are open and in photo at left doors are closed.

INSTALLS S-D AUTOMATIC DROP BOTTOM MINE CARS

The most recent development in the U. S. Potash modernization program at Carlsbad, New Mexico is the installation of 25 S-D Automatic Cars.

The S-D Automatic Drop Bottom Cars will haul potash non-stop because trips dump-on-the-move. A tripping device mounted between rails automatically opens the doors as each car moves over opening between rails at the Surge Bin. After dumping load and as each car moves out of the bin, a closing device automatically locks doors shut. Expensive dumping equipment and dumping labor are both eliminated.

The capacity of each car is between 8 to 10 tons. Each is approximately 16½ feet long by 5½ feet wide by 48 inches high. All cars are sealed against dust leakage and operate on a 42 inch track gauge. These cars are built of ½ inch steel for heavy-duty performance.

But this page isn't big enough for the whole story. We point out this Carlsbad installation as evidence that heavy-built S-D Automatics offer the most practical and most economical method of haulage for many metal and non-metallic mines. At the same time, you will not want to overlook the fact that in your particular operation our S-D Rocker-Type Side Dump Cars or our S-D Rotary Cars may be the logical answer to lower costs. Certainly, our more than 50 years of experience in building mine cars exclusively for almost every conceivable operation places us in an excellent position to build the exact car needed for your operation.

Our engineers are available at any time to assist you in adapting the S-D Automatic Car to your operation. Sanford-Day Iron Works, Knoxville, Tenn.

After 50 years of leadership in the industry, Sanford-Day still devotes its entire capacity to the production of mine cars. Most of the improvements in mine car design and construction originate with this company.

SANFORD-DAY IRON WORKS

9000 TONS of solids per day...

pass through these six 24" dia. DorrClones*!

This compact installation of six 24" dia. DorrClones, is located in the by-product plant of a large mineral producer in the Western United States. 9000 tons per day of minus 65 mesh flotation tailings are deslimed and dewatered prior to gravity concentration of wolframite, cassiterite, etc. DorrClones were selected for this operation for three reasons.

FIRST — A relatively fine separation was required at low dilution without dispersing agents.

SECOND — Space and headroom were severely limited.

THIRD — The initial cost was lower than for any other type of classification equipment.

Over a three months period, operating data have averaged as follows:

	FEED	OVERFLOW	UNDERFLOW
% Solids	35.9	27.0	61.2
GPM	542	432	110
TPD Solids/unit	1500	842	658
% Recovery		56	44

MESH	CUMULATIVE % PLUS THE MESH		
65	5.3	1.1	15.4
100	15.8	2.6	40.2
150	28.4	6.8	60.1
200	42.9	18.1	75.8
—200	57.1	81.9	24.2

If you have a desliming problem, there's a good chance that the DorrClone, with its high-capacity-for-size and ability to handle flocculant or heavy pulps, will be the solution. For further information write for Bulletin No. 2500, The Dorr Company, Stamford, Conn.

* DorrClone is a trademark of The Dorr Company, Reg. U. S. Pat. Off.

Better tools TODAY to meet tomorrow's demand

DORRCO

DORR

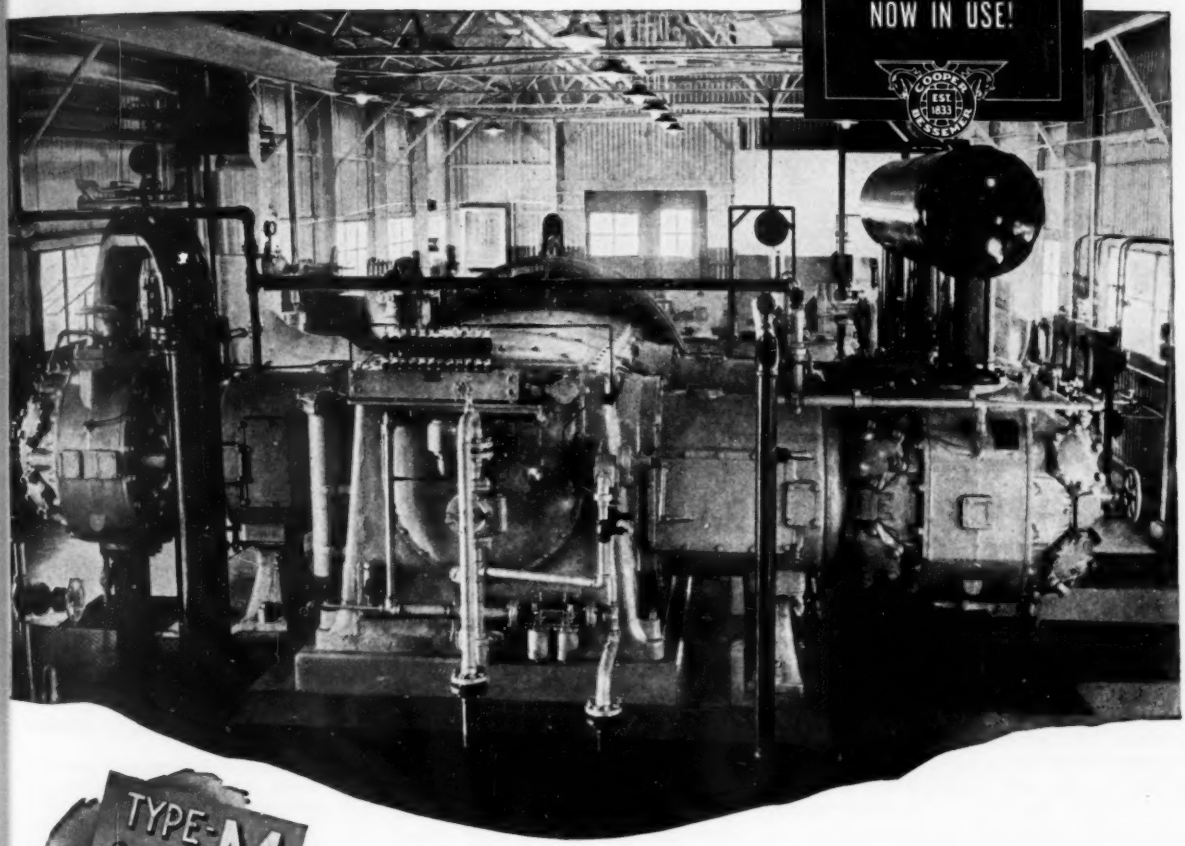
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

THE DORR COMPANY • ENGINEERS • STAMFORD, CONN.
Offices, Associated Companies or Representatives in principal cities of the world.

Cooper-Bessemer Compressors

Thousands speak louder than words!

Over 6 million Cooper-Bessemer Compressor Horsepower NOW IN USE!



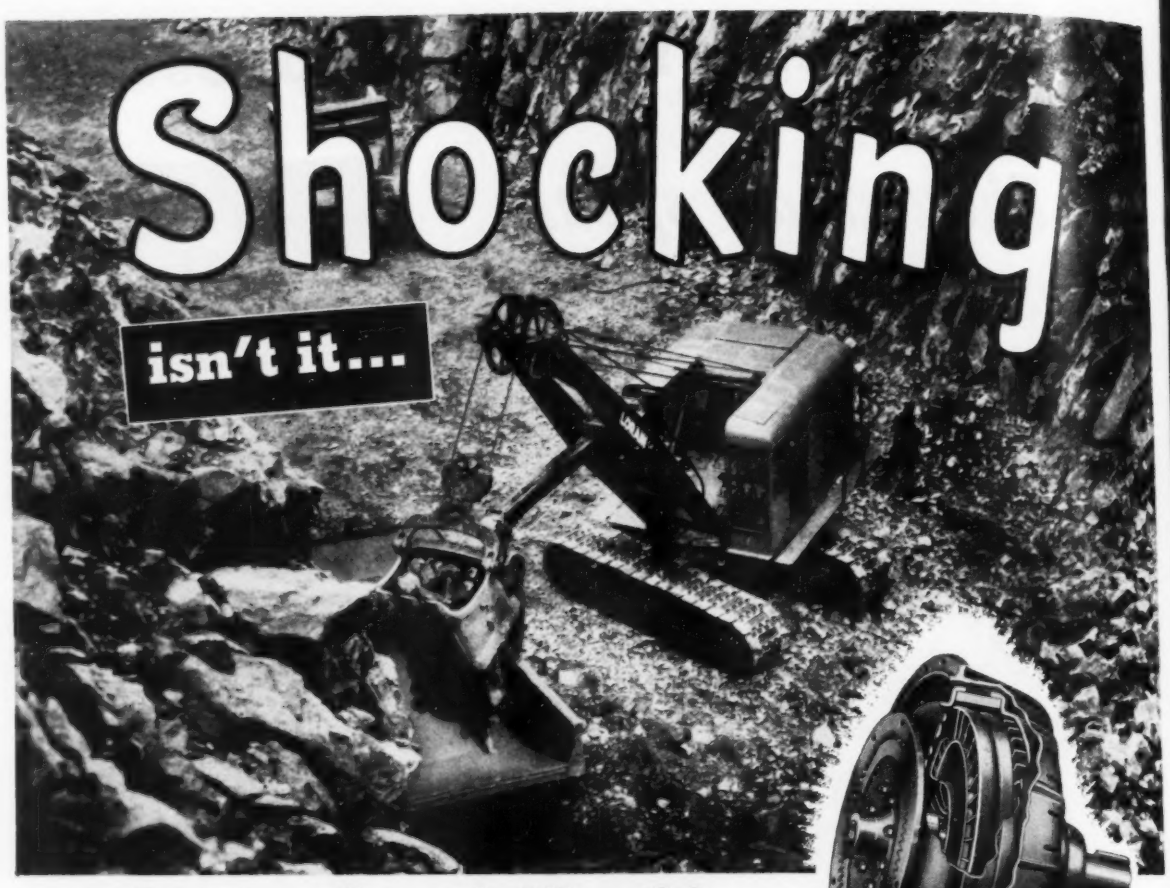
COOPER-BESSEMER Compressors of the most modern types, such as the space-saving unit shown above, today total millions of horsepower. You'll find these efficient compressors in all kinds of service. They are built for any type drive in sizes up to 5,000 horsepower, are backed by years of compressor-building experience.

Send for your copy of this new bulletin covering the features, capacities, dimensions, wight, etc. of the Cooper-Bessemer power-driven Type M compressors, 200 to 5,000 hp. Also yours for the asking are bulletins covering Cooper-Bessemer gas, Diesel and Gas-Diesel engines from 290 to 4080 hp for every type of heavy-duty power service.

The Cooper-Bessemer Corporation

MOUNT VERNON, OHIO — GROVE CITY, PENNA.

New York Washington, D. C. Bradford, Pa. San Francisco Houston, Dallas, Greggton, Pampa and Odessa, Texas Seattle Tulsa Shreveport St. Louis Los Angeles Chicago Caracas, Venezuela Cooper-Bessemer of Canada, Ltd., Halifax, Nova Scotia Gloucester, Mass. New Orleans, La.

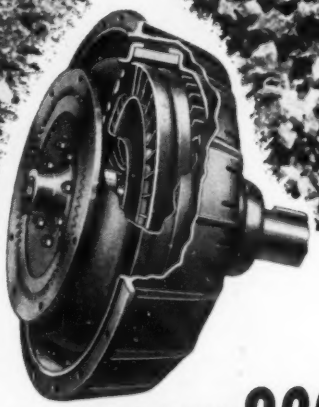


what tough rock like this *used to do* to a shovel?

If you've ever dug rock, you know what it can do to a shovel. But now, there's no excuse for the shocks and impacts of hard rock digging to wear out or break up a shovel before its time. Back in 1940, Thew-Lorain ended all that with the introduction of the Hydraulic (fluid drive) Coupling on the big 2-yd. Lorain-820. Today, it's still the best way to absorb digging shocks and strains—far more effective than any make-and-break mechanical gadget. Shocks and stresses "melt" away before any damage can be done to mechanism or cables. What's more, you can't stall a Lorain-820 engine, either, under any digging circumstances.

The Lorain Hydraulic Coupling is only *one* big feature that makes the Lorain-820 different and better than any other machine in the 2-yd. class . . . you get this feature as standard equipment. If rock digging is "shocking" to your equipment and costs, ask your nearby Thew-Lorain Distributor to tell you the Lorain-820 story — and show you proof on the job.

THE THEW SHOVEL CO., LORAIN, OHIO



LORAIN 820

Hydraulic Coupling Is Standard

Demand this feature in your next 2-yd. shovel-crane. Whether your machine must take the "shock of rock" or work on the easiest material handling jobs, you'll get s-m-o-o-t-h-e-r, money-saving performance with the Lorain Hydraulic Coupling. Lorain-820's are available on crawler and rubber-tire mountings.

820

THEW LORAIN®

SHOVELS • CRANES • CLAMSHELLS • DRAGLINES • HOES

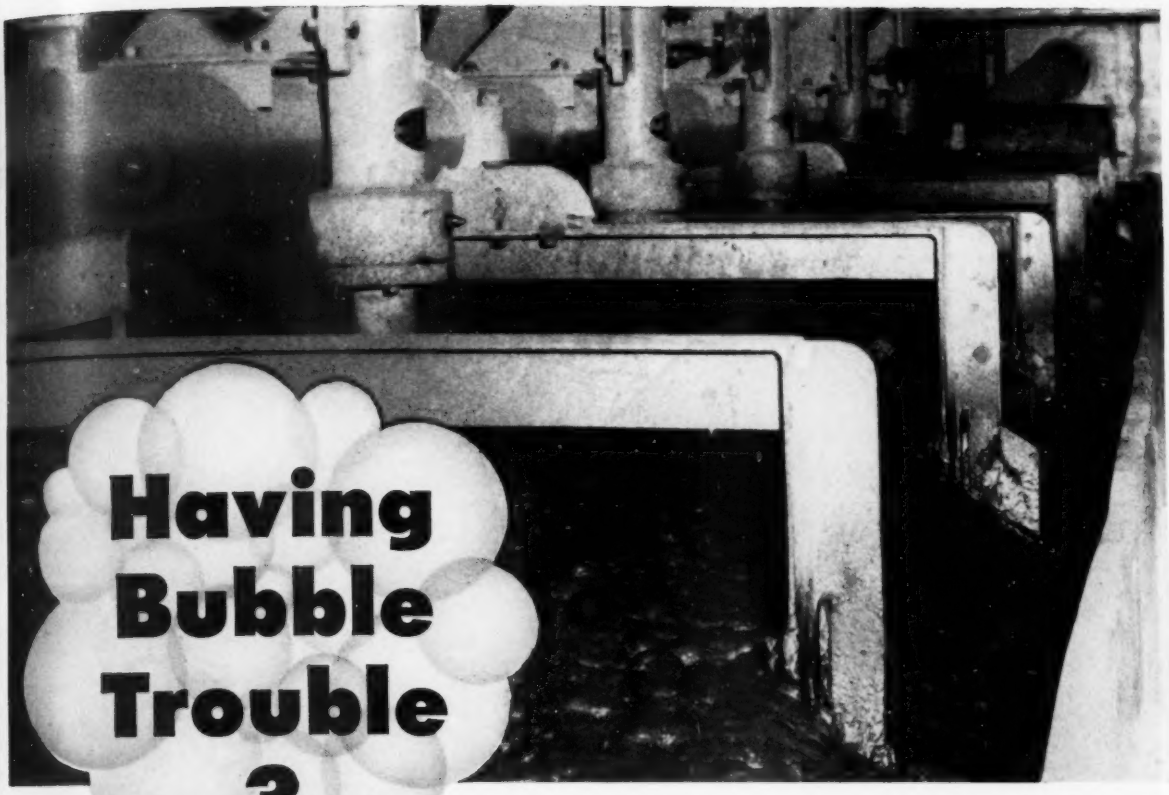


Photo courtesy THE GALIGHER CO.

Bubbles in a flotation cell are very useful and wonderful. But when they spill over the launder and get onto the power cables, all kinds of trouble can result.

Power cables for flotation cell motors have an unusually difficult life. They are subject to alkaline solutions as well as exposure to oils. That's why we feel so strongly that you should use Simplex-ANHYDREX Cables to power your flotation cell motors. These cables have specially compounded neoprene jackets that are unusually resistant to oils and to chemicals of all types, both acid and alkaline.

The insulation, of course, is the famous Simplex-ANHYDREX insulation that will resist water and moisture for indefinite periods of time and still retain its electrical and physical properties.

For these reasons we believe that Simplex-ANHYDREX Cables will give longer, more satisfactory service than any other you can buy. Want to know more?

We'll be glad to send you a catalog!

Simplex WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 Sidney St., Cambridge 39, Mass.

...is the FAST way to

DRIVE LARGE HEADINGS

faster set-up and get-out
—with creep-free Hydraulic Drill Jumbos.

fewer steel changes
—with lightweight long feed aluminum guideshells.

fast-pace drilling
—with Automatic Continuous Feed Drifters.

for full details, send for Bulletin DD-2.

SINCE 1859

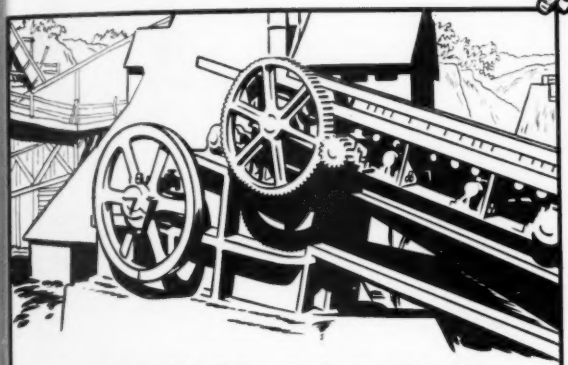
GARDNER-DENVER

Export Division: 233 Broadway, New York 7, N.Y., U.S.A.
Gardner-Denver Company, Quincy, Illinois, U.S.A.

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

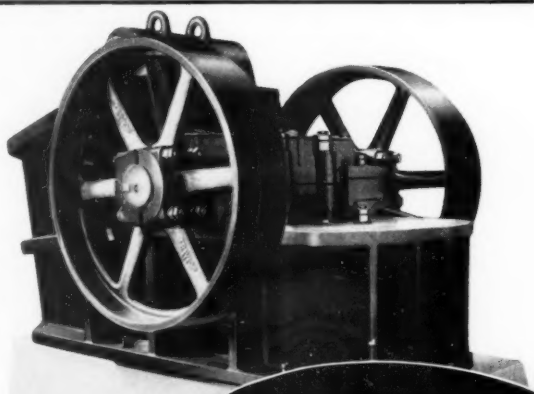
Crushing Power

Traylor Jaw Crushers, with their curved jaw plates, throttle rising costs.



In hundreds of installations, Traylor Curved Jaw Plates have out-lasted conventional plates 3 to 1. Designed to wear evenly over all . . . they retain their original curved surfaces indefinitely.

With Traylor's original curved jaw plates, choking and packing are virtually eliminated by the increased capacity of each succeeding feeding zone in the crushing area.



A **Traylor** LEADS TO GREATER PROFITS

SURE . . . I want to pin down rising costs with continuous trouble-free jaw crusher production. Send me complete specifications and descriptions on TRAYLOR Jaw Crushers!

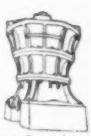
Name: _____

Position: _____

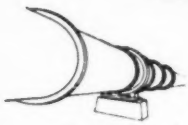
Company: _____

Address: _____ State: _____

TRAYLOR ENGINEERING & MANUFACTURING CO.
593 MILL ST., ALLENTOWN, PA.
SALES OFFICES: New York • Chicago • San Francisco
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P.Q.

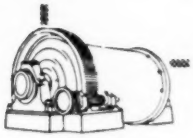


Primary Gyratory Crushers

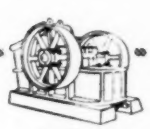


Rotary Kilns

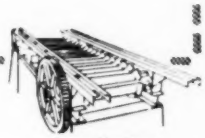
Secondary Gyratory Crushers



Ball Mills



Jaw Crushers



Apron Feeders

From Cyanamid Research

Additional Applications of Cyanogen Compounds in Base-Metal Flotation

AERO DEPRESSANT #675
A New 600 Series Reagent

This noteworthy addition to the 600 Series of Cyanamid Reagents and Processes is a highly selective depressant for metallic sulphides. It provides better control and more accurate separation than reagents heretofore available for many lead-zinc, copper-lead, copper-zinc, etc., ores. It can be used both in bulk float or for selective separations. Where precious metals are present, it has the added advantage of not dissolving gold or silver. While not a low-priced reagent, the unusually sharp selectivity of AERO* DEPRESSANT #675 warrants its test on any hard-to-treat sulphide, as these typical results indicate:

Normal flotation methods on a Philippine lead-copper-zinc ore produced a lead-copper concentrate containing galena, chalcopyrite, sphalerite, and pyrite. Treatment of this concentrate with AERO DEPRESSANT #675 gave these results:

	ASSAYS %		RECOVERY	
	Pb	Cu	Pb	Cu
Lead-Copper Conc.	46.9	8.9	100.0	100.0
Lead Concentrate	76.6	1.5	92.3	9.8
Copper Concentrate	8.4	18.41	7.3	90.2

On an African lead-copper-zinc ore in which the copper minerals are enargite, tennantite, bornite and chalcocite, the usual lead-copper concentrate was treated with AERO DEPRESSANT #675. Subsequently, the resulting lead concentrate was cleaned with additional AERO DEPRESSANT #675 to produce a cleaned lead concentrate, a lead tailing and a copper concentrate as follows:

	ASSAYS %		RECOVERY	
	Pb	Cu	Pb	Cu
Lead-Copper Conc.	53.8	15.3	100.0	100.0
Lead Concentrate	75.8	1.7	94.0	7.4
Lead Cleaner Tail	35.0	18.4	2.4	4.5
Copper Concentrate	6.5	45.5	3.6	88.1

AMERICAN *Cyanamid* COMPANY

AERO CYANIDE to Increase Zinc Recovery from Tarnished or Slimy Ores

Recent comparative tests in the Cyanamid Mineral Dressing Laboratory indicate that the addition of a small amount of AERO® Brand Cyanide can substantially increase recovery and improve grade on tarnished zinc sulphide ores and tailings and on slimy zinc ores.

In this typical series of tests on jig tailings and dump ores, Cyanamid metallurgists added a half-pound of Aero Brand Cyanide per ton of feed to the mill; conditioned with Copper Sulfate and SODIUM AERO-FLOAT® Promoter and frothed with Pine Oil. Control tests on these samples were identical, except for the omission of cyanide. These spectacular improvements in recovery and grade were obtained:

ASSAYS % ZINC WITH AERO CYANIDE

	Calc. Heads	Conc.	Tails	Zinc Recov.
Jig Tailing #2	4.54	59.86	0.10	96.3
Jig Tailing #3	3.86	59.59	0.06	97.4
Jig Feed #4	13.86	64.82	0.29	96.4
Tailing Dump #5	5.07	62.62	0.02	97.6
Tailing Dump #6	3.93	58.35	0.07	96.5

ASSAYS % ZINC WITHOUT AERO CYANIDE

	Calc. Heads	Conc.	Tails	Zinc Recov.
Jig Tailing #2	3.44	47.08	0.20	93.1
Jig Tailing #3	3.73	62.50	0.32	90.6
Jig Feed #4	12.65	62.22	0.54	94.4
Tailing Dump #5	5.29	61.80	0.77	85.2
Tailing Dump #6	3.07	59.85	0.73	76.0

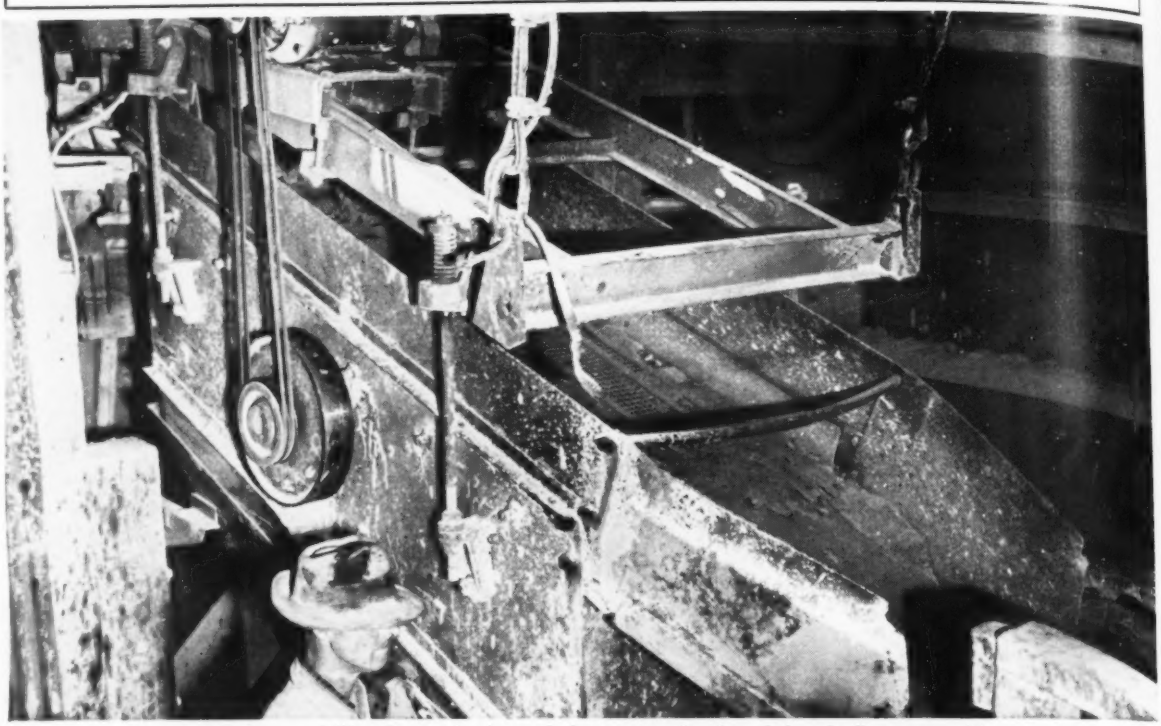
[illegible] supplier of Cyanide for over thirty years [illegible] has continuously explored the development [illegible] Compounds and Processes for their [illegible] to mineral beneficiation. Through a world-[illegible] of information flowing to and from [illegible] Mineral Dressing Laboratory, Cyanamid [illegible] engineers are kept continuously informed of [illegible] advances in milling methods, reagent combinations, [illegible] and application techniques. Supplemented [illegible] continuous research and testing in Cyanamid Mineral [illegible] Laboratory, this constitutes a very [illegible] ore dressing data available to [illegible] as part of Cyanamid's Complete [illegible] Chemical Service.

CN

[illegible] DRESSING DIVISION
[illegible] PLAZA, NEW YORK 20, NEW YORK

DENVER-DILLON VIBRATING SCREENS

Complete Milling Equipment—from testing, to feeder, to dryer!



The Denver-Dillon Screen is pictured above operating in a Colorado fluorspar mill where it saves time, labor and money by giving fast, thorough size separation.

Patented Vibrating Principle of Denver-Dillon Screens Produces Fast, Clean Separation

The patented true-circle vibrating motion of the Denver-Dillon Screens provides fast, thorough size separation. This true-circle action quickly stratifies the bed, gives an even flow of material down the screen, and repeatedly turns the material to aid the passage of undersize through the screen.

Vibration is uniform so there are no dead spots or violent vibrations which bounce the rock off in one or two jumps. The result is a smooth flow of lightly dancing material spread over the entire surface of the screen which gives you fast, clean screening. Save time, labor and money by getting size separation the first time over your screen.

EXTRA LONG LIFE

Both screen cloths and screen bodies have extra long life because the vibrating motion is a "true circle" motion. Entire screen travels in small perfect circles. Each screen is adjusted and set in our shops so that the flywheel mechanism is perfectly balanced for uniform true-circle vibration of the entire screen. Dependable mechanism assures continuous, trouble-free operation. Special camber bars prevent screen whipping, increase screen cloth life.

UP TO 50% POWER SAVINGS

Besides maintenance savings, the patented two-bearing principle of the Denver-Dillon Screen offers up to 50% power savings over four-bearing mechanisms. This is because the Denver-Dillon Screen is spring suspended and the shaft bearings carry only the weight of the vibrating mechanisms. The screen is suspended free to "float" and follows true circle motion with minimum of friction loss.

DELIVERY FROM STOCK

We have a stock supply of many Denver-Dillon Vibrating Screens for immediate delivery. Screen sizes range from 1′ x 2′ thru 6′ x 14′, maximum of four decks.

Write or wire today—find out how you can increase production and profits; get faster, cleaner size separation and long screen life with a Denver-Dillon Screen! **Free Technical Bulletin On Request**

Over 25 years of Flotation Engineering

DENVER EQUIPMENT COMPANY

1400 SEVENTEENTH ST. DENVER 17, COLORADO

NO DELAYS TO CHANGE DRILL STEEL WHEN SWITCHING BIT TYPES!

Timken® multi-use and carbide insert bits both fit the same steel

THERE are times when carbide insert bits cut costs. There are times when multi-use bits cut costs. But when it's necessary to change from one bit type to another, Timken® *interchangeable* bits take still another cut out of your costs!

The switch is made and the drilling machine is back on the job in a matter of minutes. The driller doesn't have to take time out to hunt up another set of steels. He simply unscrews one Timken bit and screws the other type right on the same drill steel. No wasted time. You don't need an expensive inventory of steels for each type of bit you use.

Both Timken multi-use and carbide insert bits give you two big extras: 1) made from electric furnace Timken alloy steel, 2) special shoulder union keeps drilling impact from damaging the threads.

We'll gladly send one of our rock bit engineers to your mine, to analyze your drilling problems and point out just where and how you can save by using the right bit types for your jobs. Just write—The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

WHERE TIMKEN MULTI-USE BITS CUT COSTS

Most economical for ordinary ground. With correct and controlled reconditioning, they give lowest costs when full increments of steel can be drilled.

WHERE TIMKEN CARBIDE INSERT BITS CUT COSTS

Give highest speed through hard, abrasive ground. Also most economical for constant-gage holes, small-diameter blast holes, very deep holes.

... your best bet for the best bit ... for every job

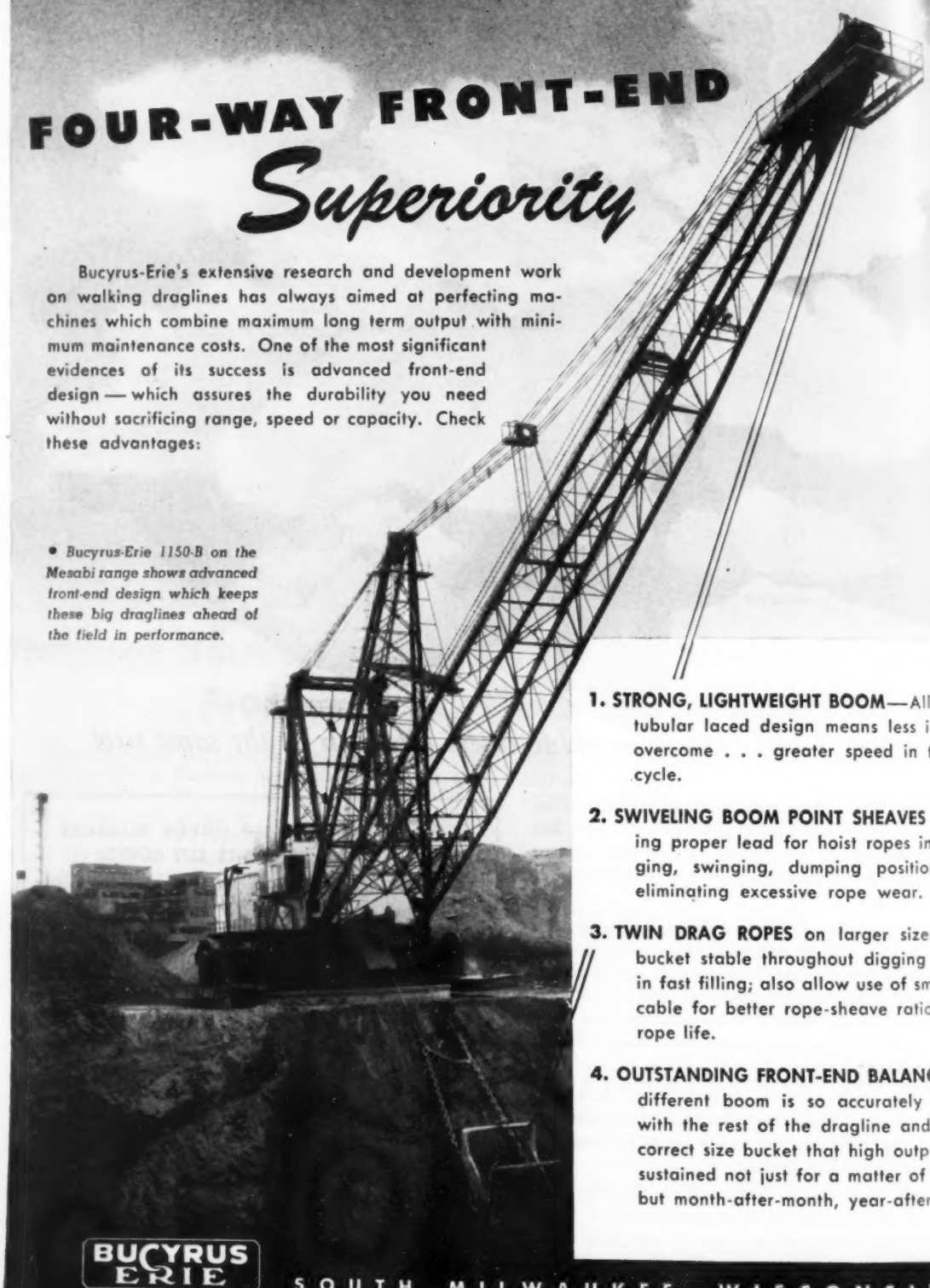
TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

For Big Output on Big Jobs . . .

FOUR-WAY FRONT-END *Superiority*

Bucyrus-Erie's extensive research and development work on walking draglines has always aimed at perfecting machines which combine maximum long term output with minimum maintenance costs. One of the most significant evidences of its success is advanced front-end design — which assures the durability you need without sacrificing range, speed or capacity. Check these advantages:



• *Bucyrus-Erie 1150-B on the Mesabi range shows advanced front-end design which keeps these big draglines ahead of the field in performance.*

1. STRONG, LIGHTWEIGHT BOOM—All-welded, tubular laced design means less inertia to overcome . . . greater speed in the work cycle.

2. SWIVELING BOOM POINT SHEAVES — assuring proper lead for hoist ropes in all digging, swinging, dumping positions . . . eliminating excessive rope wear.

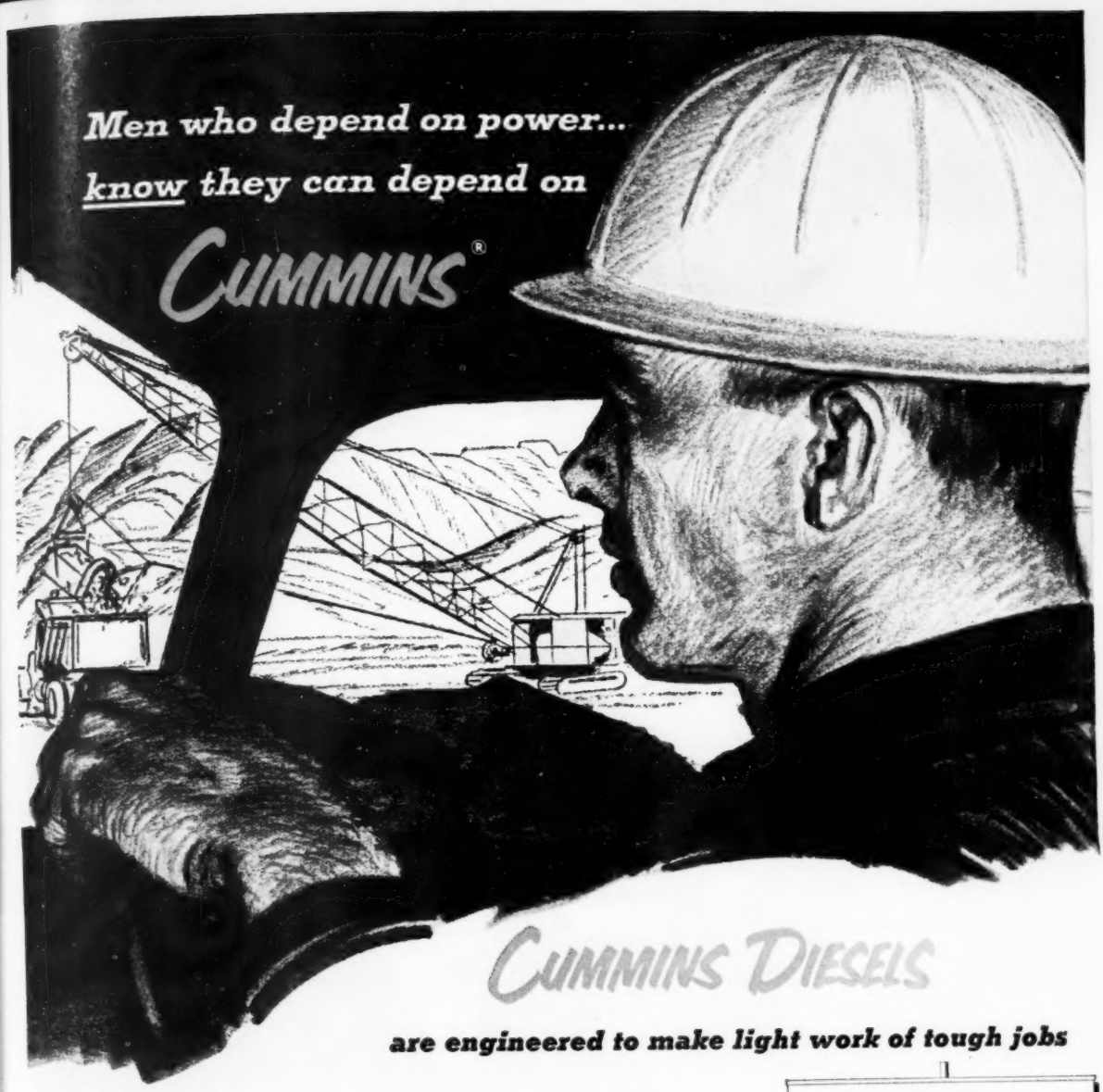
3. TWIN DRAG ROPES on larger sizes — keep bucket stable throughout digging . . . aid in fast filling; also allow use of smaller size cable for better rope-sheave ratios, longer rope life.

4. OUTSTANDING FRONT-END BALANCE—Each different boom is so accurately balanced with the rest of the dragline and with the correct size bucket that high output can be sustained not just for a matter of days . . . but month-after-month, year-after-year.

106L52

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN



are engineered to make light work of tough jobs

Why do so many mine operators count on Cummins for dependable power in toughest going?

You'll find part of the answer in the special kind of versatility that belongs to Cummins Diesels alone. It's versatility that goes beyond the handling of all kinds of jobs. It's actually an ability to meet every power requirement that any situation demands . . . to save on fuel, do more work per dollar, whether the call is for continuous power or stop-and-go operation over a wide and flexible speed range.

Yes, you can count on a (60-600 h. p.) Cummins Diesel for dynamic versatility in every job—performance that stems from an exclusive fuel system and precision engineering. See your Cummins dealer for all the facts. He's a diesel specialist . . . ready to help solve your power problems.

Enjoy thrilling 16mm Technicolor Sound Movie "DIESEL RACE CAR"
PRINTS AVAILABLE FOR GROUP SHOWINGS! WRITE TODAY.

CUMMINS ENGINE COMPANY, INC., Columbus, Indiana
Export: Cummins Diesel Export Corp., Columbus, Ind., U.S.A. • Cable: CUMDIEX

CUMMINS

***Leaders** in rugged, lightweight high-speed diesel power!*

SEATTLE: Cummins Diesel Sales of Washington, Inc.
Authorized Sales & Service: ABERDEEN—Kenny's Cummins Diesel Service.

SPOKANE: Cummins Diesel Sales, Inc.
Authorized Sales & Service: MISSOULA—Taber's Truck Stop.

PORTLAND: Cummins Diesel Sales of Oregon, Inc.
Branches: EUGENE; BAKER; COQUILLE; GRANTS PASS; PENDLETON.

BOISE: Cummins Diesel of Idaho, Inc.

SAN FRANCISCO: Watson & Meehan
Branches: FRESNO; REDDING.
Authorized Sales & Service: STOCKTON—Connell Motor Truck Company; SACRAMENTO—Frank J. Coyle; EUREKA— Fred E. Barnett; RENO—Nevada Transit Company.

LOS ANGELES: Cummins Service & Sales
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PHOENIX: Cummins & Moran
Branches: ALBUQUERQUE; EL PASO. *Authorized Sales & Service:* YUMA—Cooper Tractor Service; FARMINGTON—H. G. Cozzens Company; LAS VEGAS—Stirling Diesel Service.

SALT LAKE CITY: Cummins Intermountain Diesel Sales Co.
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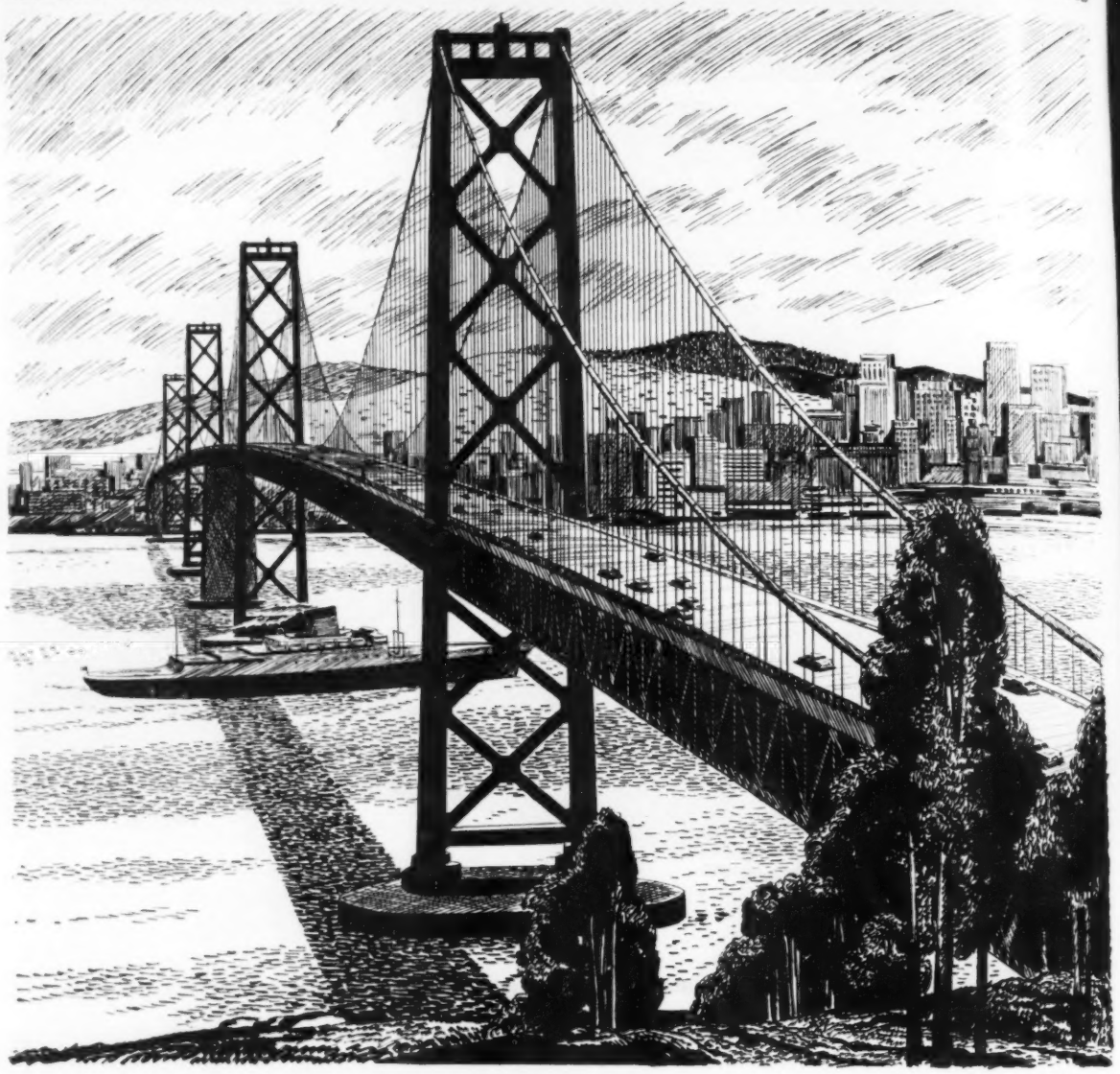
(4-2-53)

Columbia-Geneva STEEL AT WORK IN THE WEST—The San Francisco Bay Bridge, longest in the world



74% OF THIS STEEL came from Columbia-Geneva!

Of the 201,000 tons of steel that went into the San Francisco Bay Bridge, 149,000 tons—or 74%—came from Columbia-Geneva Steel.

This included steel of all types—structural steel, reinforcing steel, and steel wire for cables.

Big problems...small problems—although you may not have a "Bay Bridge" to build, remember that Columbia-Geneva produces steel of many types. Some of these products are in short supply. But we hope that when you need steel, you'll look first to Columbia-Geneva Steel, member of the industrial family that serves the nation—United States Steel.

West's Largest Steel Producer **COLUMBIA-GENEVA STEEL**

Division United States Steel Corporation

USS

UNITED STATES STEEL

...AND WHY THERE'S 3 TIMES MORE TOUGHNESS IN ANACONDA'S NEW MINING MACHINE CABLE

Your naked eye can't spot diameter differences in new cables. That's why it's important to check promptly when you *do* see variations in cable after it's been used. It has probably been crushed... by runovers or rib-pinching. Compression cuts may let in moisture *to shorten cable life.*

HOW TOUGH SHOULD CABLE BE?

As tough as we can make it—regardless of cost. One break in a cheap cable costs more than you can save by buying on price alone. The new ANACONDA Cables mean lower costs to you because they can take 3 times more abuse. In fifteen mines recently surveyed, the average life of ANACONDA Cables on shuttle cars jumped 300% over cables used only a few years ago.

WHY THE NEW ANACONDA CABLES LAST LONGER

A stronger jacket, made from a new neoprene compound, resists heat, flame and moisture better. In wet mines, sliver-cuts that may cause shocks are less likely to occur. A new cold-rubber insulation means new toughness. Moisture-wise and puncture-wise both. A new type of stranding improves the flexibility of these cables under stress.

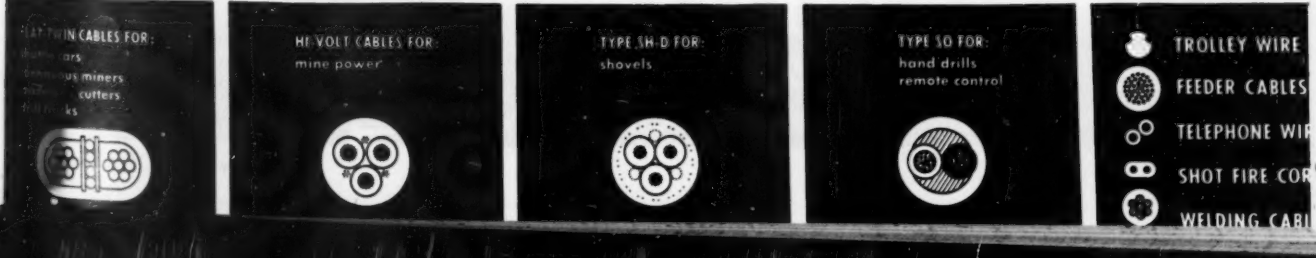
YOU BE THE JUDGE

Examine an ANACONDA Cable. See why these things are so. Call your nearest Anaconda Sales Office or Distributor for a sample. And remember: no ANACONDA Cable has ever failed a U. S. Bureau of Mines flame-test. *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

53301

ANACONDA®

TODAY'S HEADQUARTERS FOR MINE CABLE



Now!

TEE CEE Liddicoat Bits

[Tungsten carbide inserts]

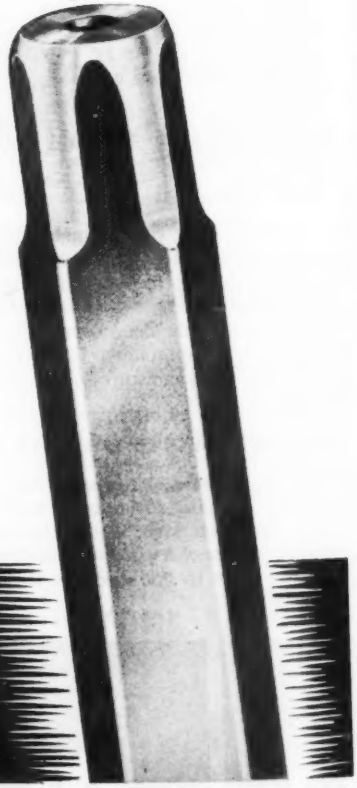
Liddicoat TEE CEE and "single use" bits both fit the same drill steel.

It's here . . . ready to go into action for you! It's the new Liddicoat Tee Cee (Tungsten Carbide insert) Bit, designed for on-the-job interchange with the famed Liddicoat Bit that is "used to destruction." Both fit the same steel. The same strong Liddicoat connection — no threads to strip — is used for both. With the new Tee Cee bit, users of Liddicoat now have a detachable bit best suited to conditions. The TEE CEE Liddicoat is the result of years of testing and research by the Western Rock Bit Manufacturing Company.

The socket of the Liddicoat TEE CEE bit is machined to an accuracy in thousandths of an inch, a degree of precision that means a stronger connection and longer bit and rod life. Flat sections — four or six — within the socket correspond with the flat sections of the drill steel — securely locking the bit to the rod.

Equipped with the new TEE CEE bit and the Liddicoat single-use bit, users have assured performance and economy in all drilling operations.

Add your name to the ever-expanding Liddicoat list of mining and contracting firms that enjoy outstanding results at lower cost. Write today for detailed information.



"Every Little Bit Counts"

Made in Salt Lake City by

WESTERN

Rock Bit Manufacturing Company

552 West 7th South • Salt Lake City 4, Utah

DU PONT "GELEX" STAYS PUT IN UPPERS

It's cohesive... economical... efficient

Many ore miners specify Du Pont "Gelex" because it gives maximum efficiency at lowest cost in a wide variety of mining operations.

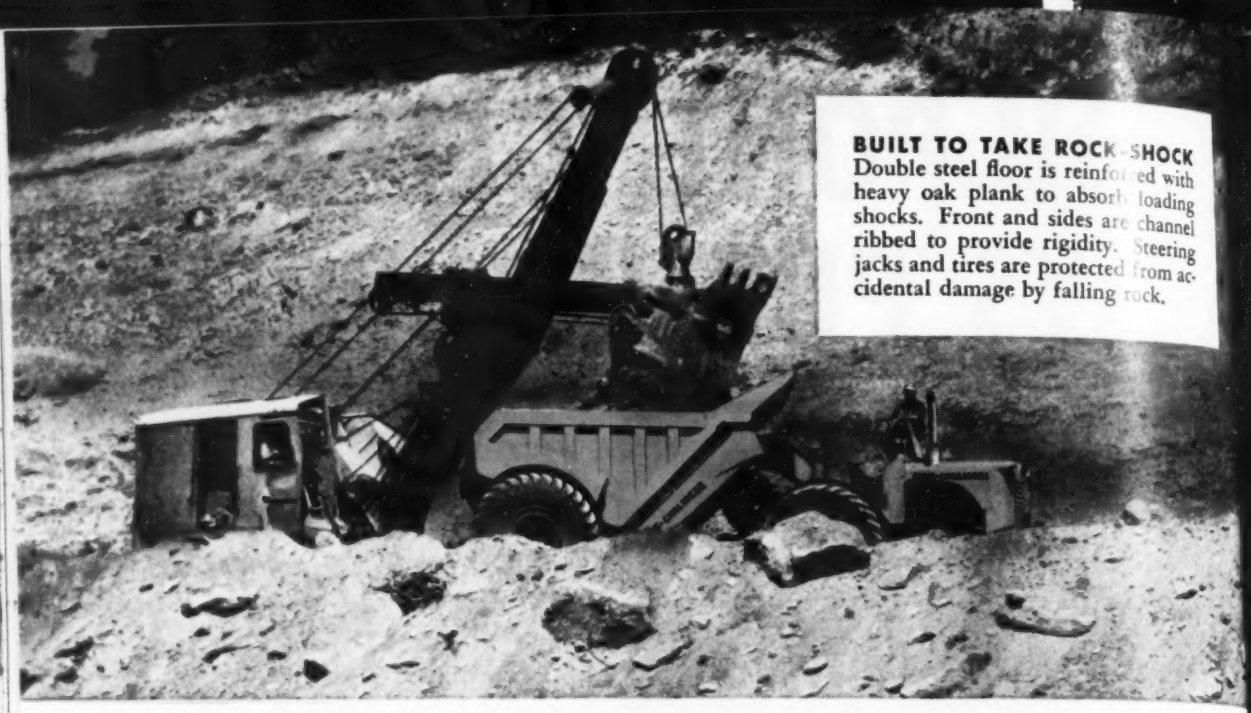
In upward-pitching holes "Gelex" is plastic enough to stay put and cohesive enough to eliminate raveling. Its excellent water resistance often permits substitution for more expensive gelatins. It gives good fragmentation and has excellent fumes.

Consider Du Pont "Gelex" for blasting requirements in your own mining operation. It's a widely used favorite that combines economy with efficiency. Any Du Pont Explosives representative will gladly give you complete information about this popular explosive. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

DU PONT
EXPLOSIVES
Blasting Supplies and Accessories

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY



BUILT TO TAKE ROCK-SHOCK Double steel floor is reinforced with heavy oak plank to absorb loading shocks. Front and sides are channel ribbed to provide rigidity. Steering jacks and tires are protected from accidental damage by falling rock.

Allis-Chalmers Motor Wagon

built to meet today's high production demands

DUMPS SAFELY . . . CLEANLY — Wheel base remains constant during entire dumping cycle. With this stable wheel base, operator may back to the very edge of a steep fill, set the powerful air brakes on *all four* wheels and put the entire load over the edge.

Clean interior, plus high, 70-degree tilt assures complete load ejection. Body may be heated by exhaust to prevent freezing of materials in severe temperatures.

MULTIPLY TRACTOR USE WITH INTERCHANGEABLE SCRAPER BODY . . . for stripping and other self-loading operations. TS-200 Motor Scraper is a high-speed, rubber-tired unit with 13-yard capacity, "through-the-center" boiling action for easy loading, positive forced ejection and many other high-production features.

Ask your Allis-Chalmers dealer for the full story

TRAVELS FAST — High horsepower-to-yardage ratio and large, high-traction rock-lug tires give fast average travel speeds — even on adverse grades and heavy going. Delivers more loads per hour; reduces idle shovel time.

ALLIS-CHALMERS MODEL TR-200 REAR-DUMP MOTOR WAGON

Choice of Engines—165 hp. Cummins; 176 hp. Buda.
Capacity — 15 cu. yd., heaped; 18 tons.
Speeds — Five forward to 21.6 mph.; reverse to 2.5 mph.
Hydraulic steering and dumping.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

BUYING A MAGNET?

selecting the correct one can be a problem —

THE SERVICES OFFERED by the Dings Magnetic Separator Company simplify the problem of correct magnet selection. The expert advice of Dings Field engineers, and the complete facilities of the Dings Laboratories are available to any firm in need of them. They assure your getting the most efficient magnet, or a magnetic separator for the job you want done, whether it's purification, concentration, tramp iron removal, scrap separation, or materials handling. Dings makes equipment for all these applications. It's described in two free catalogs, B-1600-A and C-5000-B. Both will be promptly sent on request.

Dings EM 153

MAGNETIC SEPARATOR COMPANY

4719 W. ELECTRIC AVE., MILWAUKEE 46, WISCONSIN

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT Calol Multi-Service Oils

UNITS Compressors 14x12 14x12 14x14 9x12 7½x12 10x14

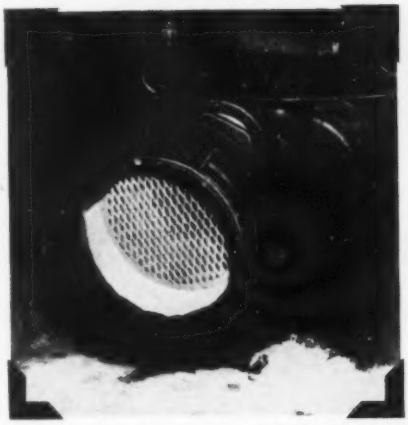
LUBRICATOR Force feed and crankcase

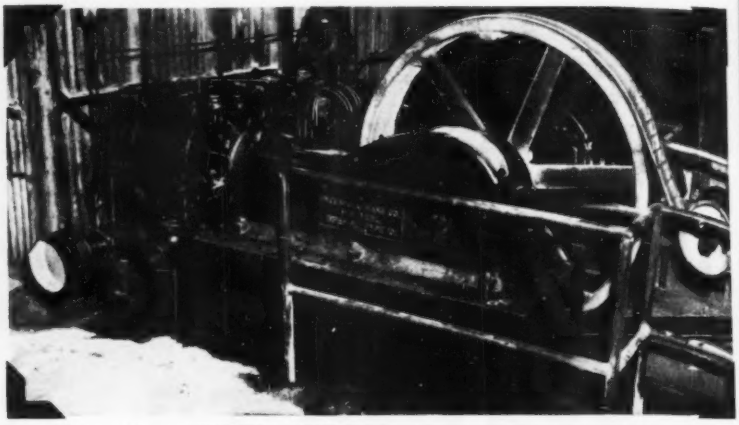
CONDITIONS Extreme dust conditions

PERIOD 7 years

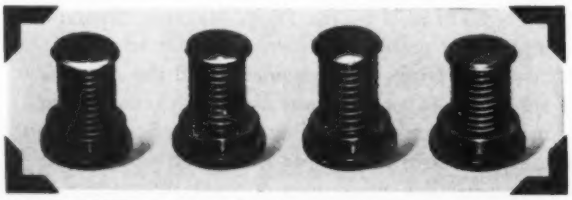
FIRM U. S. Lime Products Corp., Sonora, Calif.

Lime mine compressor rings still good after 7 years!





LUBRICATED WITH CALOL MULTI-SERVICE OIL 55X, this is one of three Ingersoll-Rand compressors that supply all air for the Sonora, Calif., mine of the U.S. Lime Products Corp. Heavy coating of lime dust on the air intake and floor indicates the extreme conditions under which the compressor works. Even so, when pistons were pulled for the first time after seven years, rings were found to have no deposits, ports and grooves were free and clean—and the entire assembly was returned to operation.



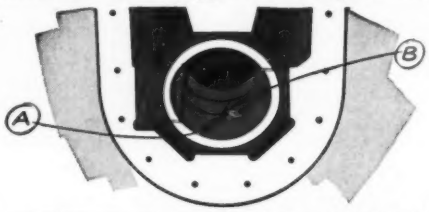
THESE VALVES, taken from the compressor's low side, get the first dust from the air intake. Note how they are free from all deposits.

FREE CATALOG: "How to Save Money on Equipment Operation," a new booklet full of valuable information, will be sent you on request to Standard Oil Company of California, 225 Bush St., San Francisco, Calif.

CALOL

TRADEMARK "CALOL" REG. U.S. PAT. OFF.

Now CALOL Multi-Service Oil cuts costs in all types of compressors



In crankcase and on cylinders, Calol Multi-Service Oil reduces wear and oil consumption —has cut consumption 20% in air compressors.

A. Oxidation-resistant compounds prevent formation of varnish. Detergent keeps contaminants suspended in oil, prevents foam.

B. Special compound assures "hot-spot" lubrication...covers surfaces rapidly.

Calol Multi-Service Oils also recommended for pumps, diesel engines, enclosed gears.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.

STANDARD OIL COMPANY OF CALIFORNIA
225 Bush Street • San Francisco 20, California

THE CALIFORNIA COMPANY
P. O. Box 780 • Denver 1, Colorado

STANDARD OIL COMPANY OF TEXAS
P. O. Box 862 • El Paso, Texas

Deadweight Down Payloads Up with

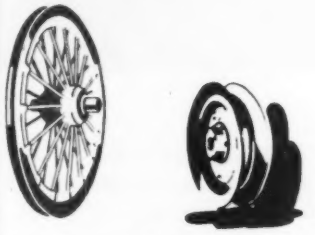
Skips and Cages—all types.

LAKE SHORE MINING EQUIPMENT

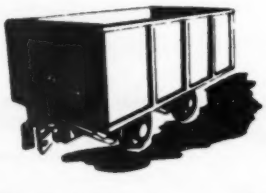
PRODUCTION INCREASES OF 8% and more have been recorded with the installation of Lake Shore engineered mining machinery, like the aluminum and steel Jeto Bottom Dump Skip (above). Lake Shore mining equipment is designed and built by men who know the field, men who know where and how to use weight-cutting aluminum, how to round the corners of tram car for greater rigidity and cleaner dumps . . . men who originated the roller bearing bicycle type head sheave and bell mouth idler sheave.

Lake Shore's experienced engineering is at your disposal either in existing models, or for the design of special machinery your operation may require.

Write today for free CATALOG 450-A.



Sheaves—Roller Bearing, Rotating Shaft and Split Type Bicycle Sheaves . . . Cast Iron, Steel and Aluminum Idler Sheaves.



Mine Cars—Lohed Tram Cars, Granby Type, Self-propelled Trestle Cars, Man Haul Cars.

102

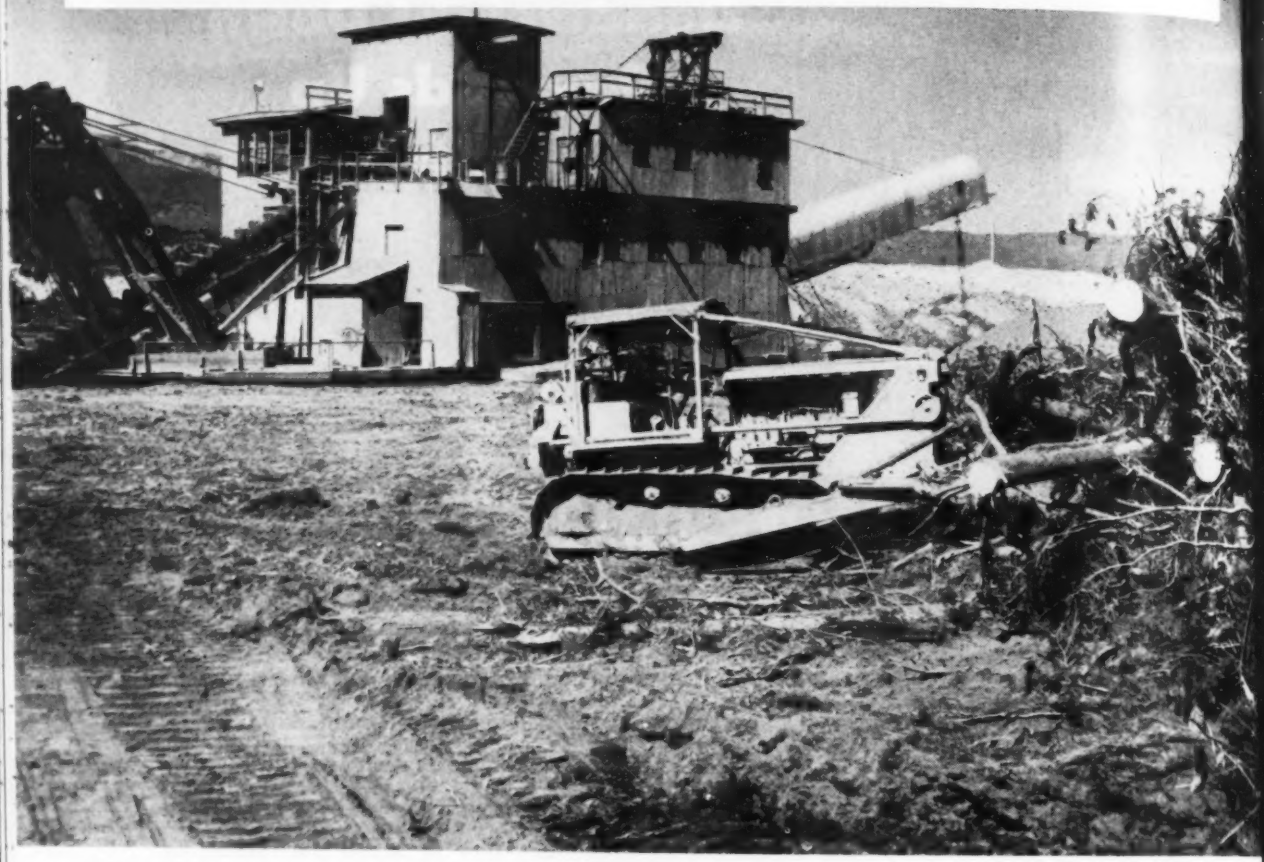
LAKE SHORE Engineering Company

IRON MOUNTAIN MICHIGAN

Look to Lake Shore for Leadership

"Long life and low repair are what we like about our Caterpillar Bulldozer!"

Jack Fisher, Dredgemaster, Baumhoff-Marshall Co., Cascade, Idaho



Since 1948, this Cat* No. 8A Bulldozer has done heavy duty for the Baumhoff-Marshall Co. on its monazite operation near Cascade. It clears for the dredge, levels tailings and tows trucks out of swamps, working efficiently even in muddy going. "It has done a very good job and we are well satisfied," Jack Fisher says. "Long life and low repairs are what we like about it."

On thousands of other mining operations all over the world, men who also keep a keen eye on costs echo that report on Caterpillar Bulldozers. They know from on-the-job figures that these rugged yellow machines outwork and outsave ordinary units. There are many reasons. Precision manufacture and balanced engineering build extra stamina and extra working years into them. Tractor horsepower and blade capacity are matched for smooth performance. The scientifically curved blade keeps material rolling ahead fast. Blade and end bits are made of tough steel for long, hard wear. Precision controls and good visibility enable the operator to turn out big, steady production. And your Caterpillar Dealer backs every machine with genuine parts and service, *when* and *where* you want it.

Take a tip from thousands of proving grounds of experience. Dollar for dollar, there's no better investment than Caterpillar Bulldozers. Ask your dealer for full information and a demonstration.

Caterpillar Tractor Co., San Leandro, Calif.; Peoria, Ill.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

CAPITOL CONCENTRATES

DEFINITE PLAN NEEDED NOW TO SPEED DOMESTIC MINING

The mining industry is deeply concerned by the new Administration's apparent lack of definite plans or programs to encourage domestic mining. Although copper is still in strong demand, lead and zinc, as everyone knows, are so low-priced due to foreign competition that many domestic mines have closed down and more will pull the pumps unless something is done. Such programs as are operating are left-overs from the previous Administration, and, although they are not altogether satisfactory, they at least provide definite objectives.

In the meantime, DMPA is disintegrating rapidly and a process of preclosing liquidation seems to be the order of the day. Many of the key men have left or are leaving. Maintenance-of-production copper contracts were automatically cancelled the day the OPS ceiling price was removed, but the immediate raise in the domestic copper price probably bailed most of these mines out of a potentially hazardous situation.

Perhaps when DPA, NSRB, and the Munitions Board are combined with the Office of Defense Mobilization, and can settle down to do some real planning, something constructive may come in the way of policy.

• *Malone Plans Fight On SEC*

According to newspaper reports, Senator George Malone of Nevada, member of the Interior and Insular Affairs Committee of the Senate and chairman of its mining subcommittee, will introduce into Congress a bill "calculated to break the stranglehold the Security and Exchange Commission has on the mining industry." This is a tall order and we wish the Senator well in this endeavor.

• *What Price Rhodesian Copper?*

Negotiations have been completed to import around 100,000 tons of copper from Rhodesian mines. If this source could be further exploited, Chile might have to look to her laurels, especially if the price turns out to be lower than Chile's.

• *Inclusion Of Mining Will Be Asked*

Senator Barry Goldwater of Arizona has been asked to attach an amendment to the Capehart bill in the section which authorizes the Small Defense Plants Administration. This amendment would make sure that mining projects are included, and is especially necessary now that the defense agencies are disintegrating.

• *Anderson Seeks To Limit Mining Rights*

The bill S. 783 reintroduced into this Congress by Senator Clinton Anderson of New Mexico is a further attempt to encroach upon the rights of those locating mining claims on the national forests. The Forest Service feels close to Anderson as he formerly was Secretary of Agriculture, and believes that he will be their champion in the Interior and Insular Affairs Committee whence the bill was referred. Fortunately, mining also has friends on that committee who would not like the limitation, to use the words of the bill, "that no use of the surface of the claim *or the resources therefrom* not reasonably required for carrying on mining or prospecting shall be allowed *except under the national forest rules and regulations.*" Placer mining in the national forest could, under this bill, be completely hamstrung by regulation by the Secretary of Agriculture.

• *From Bad To Worse*

Industry complained of the two-price copper situation under OPS. Now OPS is withdrawn, but instead of getting a one-price system, the confused industry is operating under half a dozen assorted prices.

• *Where is Mining's Representative?*

It seems odd indeed that "Resources for the Future," a group financed and established by the Ford Foundation to peer into the national resources future up to 1975, à la Paley, does not have a representative of a mining organization on its Council of Sponsors.

• *First Step Toward Federal Control*

An attempt is being made to introduce a bill in Congress which would require all mines to report accidents to the U.S. Bureau of Mines and which would authorize the Bureau's representatives to visit any mine without permission of the owner. This, clearly, is the first step toward a general mine inspection bill such as regulates the coal industry. The bill being considered also authorizes drafting of a code.

• *Senate Group Sponsors Gold Study*

The Senate, through Senator Butler of Nebraska, is sponsoring a private organization of economists who will investigate the expediency of gold convertibility with currency. It is stated that the study will take about a year. In the meantime, pressure for increasing the gold price grows steadily.

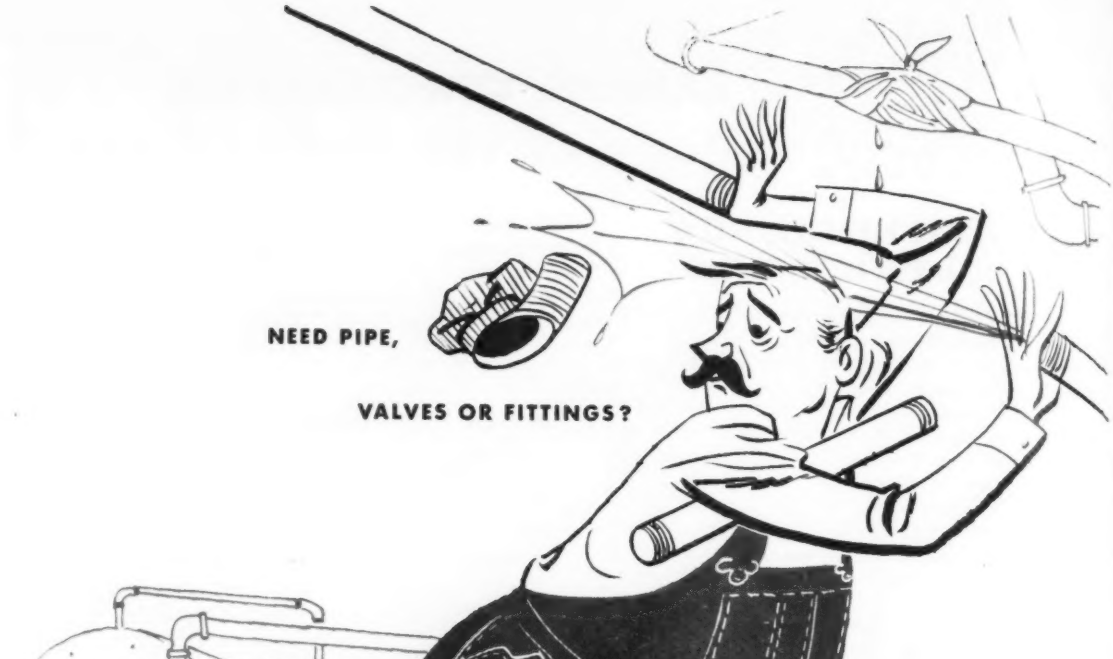
• *Let's Strengthen Act—Not Repeal It.*

A very dangerous bill for domestic industry is H. R. 613 by Representative Frank Smith of Mississippi to repeal the "Buy-American" Act.

Smith's speeches have exhibited a good deal of poor economics and some downright misinformation. He stated that the act prevents purchasing foreign materials unless they are 25 percent cheaper than American products. Actually, the law says nothing about 25 percent and agencies of the government could pay domestic producers nearly any amount about the foreign prices. As a practical matter, however, a 25 percent policy has been set. The act is so weak and has such exceptions and waivers that it is more honored in the breach than in the observance. Someone should introduce a bill to strengthen the act.

• *Deficiency Should Be Corrected*

The bill introduced by Representative Hill of Colorado—H. R. 4090—to set up a Small Business Administration to take over the functions of the Small Defense Plants Corporation and the small loan functions of the



LET REPUBLIC SUPPLY YOUR INDUSTRIAL NEEDS!

He said: "I'm trying to find a double-strap saddle. Everyone I call thinks I'm a cowboy. I hope *you* understand I don't intend to use it in a hopalong capacity." *We said:* "We have 'em in stock. How many, what size, and where do we send 'em?" *The Moral:* Let REPUBLIC SUPPLY your industrial needs—not only pipe, valves, and fittings but shop supplies, rigging materials, mechanical rubber goods, abrasives, tools and machinery. You'll enjoy their prompt "one-call" service—and you can rely on Republic Supply's outstanding stock of over 35,000 industrial products.

THE REPUBLIC SUPPLY COMPANY

Los Angeles Office — phone: UNderhill 0-2511; San Leandro — phone: LOckhaven 2-0414; Phoenix — phone: ALpine 4-3434
Pipe, valves and fittings • abrasives • shop supplies and tools • rigging materials • mechanical rubber goods • machinery • oil field supplies

An independently owned and operated company serving Western industry

RFC is deficient in the same area as was the Smaller War Plants Act of the last war and the Small Defense Plants Act of the emergency. It does not specifically designate small mines as small business. Past experience indicates that unless this is done in the act, mining will receive little or no benefit from the legislation.

• Congressmen Ask To Be Heard

The Western Conference of Senators, headed by Senator Pat McCarran, Nevada, has asked the Administration to do nothing about reorganizing the Interior Department without suggestions and consultations with interested congressmen.

• Free Market For Industrial Gold Suggested

There is a strong movement among gold producers for legislation which would bar the jewelry and other gold consuming industries from purchasing their gold from the United States Treasury at the $35.00 per ounce rate. With a free market in industrial gold, jewelers and others probably would have to pay considerably more per ounce than the monetary rate. Industrial consumption of gold is at such a high rate that if this type of a free market were set up, little or no gold would be offered to the Treasury.

• Same People—Another Level

Now that DPA has been absorbed into ODM, do not expect more action or common sense—the same people are running it on the second level.

• Access Road Appropriation Passed

The Congress has passed an appropriation of $13,000,000 for access roads, $8,000,000 to take care of present commitments, and $5,000,000 for new roads. The appropriation is a cut of $10,000,000 from the $23,000,000 the agencies originally requested, and carries less than half a million dollars for mine roads.

• Emergency Agencies Are Being Absorbed

The National Security Resources Board, authorized by the Congress to be the nation's top planning and policy unit, has gradually lost its force. In fact it never attained the stature intended for it. Now, all its employes discharged, its functions have been transferred to the Office of Defense Mobilization. The Munitions Board, another legally potent body, is said to be scheduled for the same fate. The Defense Production Authority, which overlapped both NSRB and MB, has been absorbed by ODM. The Defense Materials Procurement Agency seems to be coming apart at the seams and its engineers and other employes are getting themselves placed elsewhere as rapidly as they can before the final disintegration. There is merit in combining and condensing, but as yet there has not emerged any organizational pattern of the old War Production Board type, such as should have been set up at the beginning of the emergency.

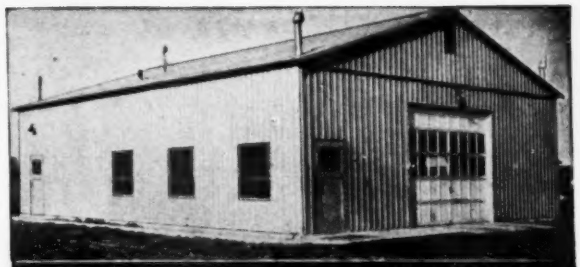
COMING CONVENTIONS

May 14, 15, and 16. PACIFIC NORTHWEST METALS & MINERALS CONFERENCE, sponsored by the AIME. Benjamin Franklin Hotel, Seattle, Washington.

July 13 to 16, 1953. Fiftieth anniversary meeting IDAHO MINING ASSOCIATION, Sun Valley, Idaho.

August 31, September 1. Third Biennial Briquetting Conference, Banff Springs Hotel, Banff, Alberta, Canada.

October 28 through 31. INTERNATIONAL MINING DAYS sponsored by the New Mexico Mining Association and the Mining Committee of the El Paso, Texas Chamber of Commerce. El Paso, Texas.



COLUMBIAN ALL-METAL BUILDINGS

Strong • Fire-Safe • Low Upkeep

Columbian All-Metal Buildings are increasingly popular with the mining industry because of their unlimited utility value—for warehouses, engine houses, dryhouses, shops, garages, compressor houses, etc. Prefabricated from quality steel. Sectional construction assures easy, low-cost erection. Exceptionally weather-tight. Rigid, strong, fire-safe. Minimum upkeep. Order from distributors listed below—or write direct for complete information.

COLUMBIAN STEEL TANK CO.

P. O. Box 4048-H, Kansas City, Mo.

Distributors in the United States

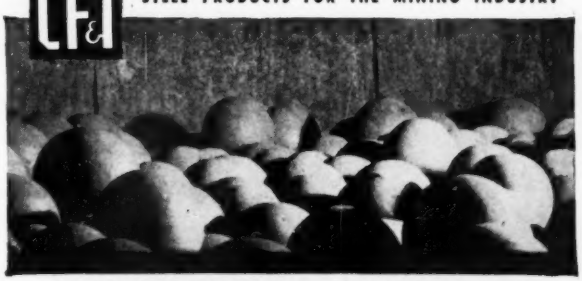
Denver Equipment Company
1400 Seventeenth Street
Denver, Colorado

Eimco Corporation
34 South 4th West Street
Salt Lake City, Utah

Distributors—Foreign

Avenida Ejercito Nacional 458-D
Colonia Chapultepec Morales
Mexico, D. F.

CF&I STEEL PRODUCTS FOR THE MINING INDUSTRY



FORGED STEEL GRINDING BALLS

CF&I Grinding Balls are forged from special analysis steel to impart the high impact and abrasion resistance that enables them to wear evenly and remain spherical.

The assistance of CF&I metallurgists and engineers is always available to help solve any grinding problem. Perhaps they can help you increase production or lower operating costs.

CF&I Products for the Mining Industry

Cal-Wic Wire Cloth Screens • Mine Rails and Accessories
Rock Bolts • Wickwire Rope • Grinding Balls • Grinding Rods

THE CALIFORNIA WIRE CLOTH CORPORATION, OAKLAND
THE COLORADO FUEL AND IRON CORPORATION, DENVER AND NEW YORK

CF&I FORGED STEEL GRINDING BALLS
THE COLORADO FUEL AND IRON CORPORATION

1134

Holes loaded and ready to shoot.

Peak of blast. Confinement is good.

Spent gases appear—air blast avoided.

Well placed final pile. Throw controlled.

the inside story

Here's how ROCKMASTER blasting helps control throw

THIS blast area on By-pass Route 22, Easton, Pa., was adjacent to gasoline storage tanks, homes, a parking lot, business establishments and a precision instrument factory. It was a ticklish blasting problem for Central Pennsylvania Quarry, Stripping and Construction Co., contractors on the job. Absolute control was a "must." Flying rocks had to be minimized . . . along with noise and vibration.

The ROCKMASTER pattern illustrated above was designed to keep blasted material from falling down the slope. The holes were carefully loaded and adequately stemmed. As the blast was fired, it advanced in alternate delay periods from ROCKMASTER No. 1 to No. 6. The row toward the slope fired first and gave relief for subsequent rows. The general heave inclined toward this relief—up the slope.

When you have shooting problems like this, ROCKMASTER can help you too. Send for your copy of the ROCKMASTER Blasting System Booklet.

ATLAS

ATLAS EXPLOSIVES

"Everything for Blasting"

ATLAS POWDER COMPANY, *Offices in principal cities*
SAN FRANCISCO 4, CAL. • SEATTLE 1, WASH.

INTERNATIONAL PANORAMA

PARIS—The French Customs Board is reimposing import duties on lead, zinc, manganese, and other metals to prevent closing of French mines from dumping of metals from world markets. The lead duty is eight percent ad valorum.

KITWE, NORTHERN RHODESIA—The British government is selling between 75,000 and 100,000 tons of blister copper to United States custom smelters for conversion into electrolytic copper.

SPOKANE—The Anaconda Copper Mining Company has returned the Bonzana mine to Gibbs and Hunley. Anaconda did not complete its option payments for the purchase of the mine.

JAKARTA—The joint Billiton State Mining Company has been granted a five-year extension to its Billiton Island tin mining concession. Eventual renewal is foreseen after this contract expires on February 28, 1958.

MEXICO CITY—Four mining companies have signed manganese ore delivery contracts with the United States, DMPA. The ore will be produced at 30 to 40 small mines in the states of Chihuaha, Durango, Zacatecas, and San Luis Potosi.

MONTREAL, QUEBEC—Patrick Harrison & Co. Ltd. have signed a contract to mine 1,000,000 tons of asbestos-bearing rock at the open-pit mine of Dominion Asbestos Mines Limited.

JUNEAU, ALASKA—Kenai Chrome Company has signed a contract with the DMPA for mining and delivery to a Puget Sound, Washington port 13,000 long tons of chromite from its Red Mountain deposit on Kenai Peninsula.

WASHINGTON—Legislation has been introduced in the United States House of Representatives for a sliding scale lead and zinc equalization import tax to "stabilize domestic production."

METALINE FALLS, WASHINGTON—Sullivan Mining Company has suspended development work on the Metaline Mining and Leasing Company's claims because of the low lead and zinc prices.

GREAT SLAVE LAKE, NORTHWEST TERRITORIES—Pine Points Mines Limited, a subsidiary of Consolidated Mining and Smelting Company of Canada Limited, has developed several million tons of open pit lead-zinc ore by diamond drilling. Underground development is underway.

DOUGLAS, ARIZONA—Phelps Dodge Corporation's mines produced 453,168,649 pounds of copper, 17,343,207 pounds of zinc, 2,818,278 pounds of lead, 2,372,710 ounces of silver, and 4,374 ounces of gold in 1952.

WASHINGTON, D. C.—The OPS has abolished all price controls. Among the last items to be freed were sulphur, columbium, molybdenum, tantalum, nickel and beryllium alloys.

KITWE, NORTHERN RHODESIA—The International Bank for Reconstruction and Development has loaned $14,000,000 to Northern Rhodesia to be spent for rail improvements and to build a new railroad to the Indian Ocean coast.

KELLOGG, IDAHO—Bunker Hill & Sullivan Mining and Concentrating Company and the DMPA are financing a $1,098,750 exploration project at the Crescent mine. The shaft will be deepened 2,000 feet to the 3,000 foot level in search of high-grade silver-lead-copper-zinc ore.

LEOPOLDVILLE, BELGIAN CONGO—The first post World War II shipment of copper to the United States has been made by the Union Miniéré du Haut Katanga.

CLEVELAND, OHIO—The Brush Beryllium Company has completed its new beryllium copper master alloy plant which increases the nation's supply by 54 percent. Beryl supply is good and new uses for beryllium and its alloys and compounds are sought.

WASHINGTON, D. C.—The Defense Materials Procurement Agency has revoked its Mineral Order 1 which has prohibited hoarding of strategic minerals and metals since 29 December 1950.

KUALA LUMPUR, MALAYA—World tin production in January set a new post-war record of 17,000 tons.

RAY, ARIZONA—United States production of copper by Kennecott Copper Corporation in 1952 was 889,164,000 pounds, compared with 860,273,000 pounds in 1951.

CHICAGO—The Crane Company will build a $26,000,000 titanium plant near Nashville, Tennessee to produce 6,000 tons of metal annually when it gets a United States government contract for financing and metal purchase guarantees. Total United States titanium metal output in 1952 was 922 tons.

CANBERRA, AUSTRALIA—Additional discoveries of uranium have been made in the Northern Territory not far from earlier discoveries near Edith River.

BARTOW, FLORIDA—International Minerals and Chemical Corporation has placed its new Bonnie triple superphosphate plant in operation. Byproduct uranium will be recovered at this plant.

SANTIAGO—A new Ministry of Mines has been established by Presidential Decree. It will coordinate all mining and oil activities of the government.

BATHURST, NEW BRUNSWICK—Spectrographic analysis of a diamond drill core from the lead-zinc ore body at Brunswick Mining and Smelting Corporation has shown tin and tungsten.

TORONTO, ONTARIO—The Falconbridge Nickel Mines, Ltd. has signed its second contract with DMPA for sale of nickel. The new contract calls for sale of 100,000,000 to 200,000,000 pounds of nickel in the next 14 years. 2,000,000 pounds of cobalt and important tonnages of copper are also covered by the agreement.

TWO HARBORS, MINNESOTA—Lake shipments of Mesabi Range iron ores started in late April with shipments of 59,099 gross tons in the week ending April 30th.

VANCOUVER, BRITISH COLUMBIA—Bralorne Mines Limited (N.P.L.) has developed on its 26th level a gold ore shoot 1,233 feet long, 5.53 feet wide assaying 0.65 ounce per ton. The ore is in the "77" vein where wall rock is all greenstone on the new level in contrast to diorite in higher levels.

Research Program Finds New Use for Antimony

A compound of aluminum and antimony has been developed by the Battelle Memorial Institute to produce an electrical semiconductor that may compete with germanium and silicon for use in transistors, rectifiers, and other electronic devices. The Battelle program was sponsored by the Bradley Mining Company which owns the Yellowpine antimony mine and smelter at Stibnite, Idaho.

Bell Telephone Laboratories of New York, New York is vitally interested in the compound for use in its communication and electronic work, and a shipment of 50 pounds of the antimony metal which is 99.9 percent pure has been sent to the Laboratory from Stibnite. Bell technicians will use it in experimental equipment.

New Commonwealth Group Will Aid British Mining

The Commonwealth Development Finance Company has been formed to give effect to the recommendations of the Commonwealth Economic Conference which decided to develop the Commonwealth's primary industries, especially mining. The new group has a capital of £15,000,000, and borrowing powers of £30,000,000 as a start.

Sir Ernest Oppenheimer, one of world's most prominent mining financiers, is on the board, along with seven other top industrialists and bankers, all of whom specialize in international trade. It is hoped that the company will materially assist mining in the Commonwealth and, in some measure, retrieve London's old position of financial center of the world's mining finance.

France Reimposes Duties On Nonferrous Metals

The French Customs Board has reimposed import duties on non-ferrous metals and a number of chemical products to protect domestic producers. These duties had been suspended while these materials had been scarce in France. Reestablishment of the duties is expected to bridge the difference between domestic and foreign prices so that French consumers will buy within the French territories.

Foreign lead, for instance, has been cheaper than domestic lead despite recent price cuts which lowered the price from 165 francs per kilo in January 1952, to 100 francs in 1953. France is self-sufficient in lead and further price declines would cause closing down of some of the French mines. Reestablishment of the customs duty in this case would add eight percent ad valorem to the foreign lead price.

LEFT: The Hartley No. 8 skip-equipped vertical shaft where 1,400 tons of zinc-lead ore are hoisted daily from the Ballard-Shanks-Moore-Hartley mines. RIGHT: St. Louis smelting treats zinc-lead ore from its mines west of Baxter Springs, Kansas in this gravity-flotation plant.

NATIONAL LEAD COMPANY DRIVING 16 BY 14-FOOT CROSSCUT 2,250 FEET TO VELIE SWALLEY

Firm's St. Louis Smelting Division uses a two-drill jumbo, Eimco 104 loader, and rubber-tired Diesel trucks to drive Kansas mine heading 200 feet monthly

The National Lead Company's St. Louis Smelting and Refining Division has streamlined its Kansas lead-zinc mining operations to lower costs and increase production.

One of the most important features of the program has been the centralization of all ore hoisting through the Hartley No. 8 vertical shaft. This has eliminated costly duplication of hoisting facilities storage bins, and surface transportation equipment.

Mining of 1,400 tons of ore per day from the Ballard-Shanks-Moore-Hartley mines, two miles west of Baxter Springs, has been expedited by the use of the one centrally located, high-capacity, skip-equipped shaft. This system is unique inasmuch as hoisting has customarily been done in the Tri-State by numerous low capacity can hoisting shafts.

Well-graded and adequately maintained underground mine haulage roads and high speed, rubber-tired, Diesel-powered off-track mining equipment have speeded ore production, at less cost, with a smaller number of underground employees.

Long Cross Cut

After surface churn drilling on the Velie Swalley property northwest of the Ballard mine disclosed an orebody about one-half mile from the nearest underground workings, National Lead's management decided to continue hoisting through the central shaft. This necessitated driving a 2,600-foot long, 16 by 14-foot haulage crosscut N. 40° W. to reach the Velie Swalley orebody. All ore could be hauled through this crosscut to the central shaft, eliminating the need for reconditioning an existing Velie Swalley shaft and a surface road to the Ballard mill. The decision in favor of the crosscut was influenced by the fact that ore could be mined adjacent to the crosscut as it was driven.

Planning and supervising the crosscut are Harold A. Krueger, division manager; Kenneth Nobs, general superintendent; and Donald Waltman, mine superintendent.

The 16-foot width was necessary for a good road and drainage ditch; the 14-foot height was required to give adequate head room in which to operate the Eimco 104 Caterpillar mounted loader which was selected to muck out the broken rock.

The company has been driving this crosscut (pull drift is the local name), for 2,250 feet and is currently advancing it 200 feet per month, working a six-day week. A truck and jumbo turnaround is slabbed out of the side of the drift every 600 feet.

A 38-hole burned cut round (see diagram) is drilled to a depth of 12 feet. Initial experimenting proved that a 24-foot round could be pulled, but it took so long to wash the cuttings from the holes that such a round was impractical.

Two Machine Jumbo

This round is drilled by two Ingersoll-Rand 505 chain-fed drifters equipped with 15-foot sashes and steel centralizers mounted on a Rogers Iron Works hydraulically controlled jib jumbo. Each machine can be spotted independently of the other so that no time is lost, as frequently happens with a platform jumbo where one machine waits for the other to finish a hole. An abundant supply of air at 90 pounds per square inch pressure is the key to fast drilling of these deep holes, so a four-inch air line is kept within 100 feet of the face. (A two-inch water line parallels the air line). The Jumbo is equipped with two air motors, one on each side, which drive the tracks independently. The two-man drill crew comes on shift at noon and drills out the round before going off shift.

Experience has shown that it takes a great deal of powder to break the hard chert, so large diameter, 2⅜-inch holes are drilled. Only one piece of round steel 14 feet long and 1¼ inches in diameter is required to drill a hole with the long-feed machines. Use of the 15-foot sash has

LEFT: Left to right: Ned Wood, geologist; Dr. H. L. Scharon, consulting geologist; and Jim Short, mine foreman, check the geology of a section of the "pull drift." Jim has worked in the mine 19 years and contrasts the difference between mule haulage and the fast Diesel-powered trucks used today. RIGHT: Mill tailing is elevated three times for stacking at the Ballard mill.

been an important factor in speedy drilling of the round.

Special powdermen load and blast the round at midnight, when the afternoon shift ends. Seven boxes of Extra Dynamite C in 1¼-inch sticks are used per round. Holes are loaded from a flat bed truck.

Millisecond delay electric caps are used to fire the round in the order shown in the diagram. A 440-volt, 25-cycle AC blasting circuit is used for power. Experience has shown that millisecond caps break the ground better, but care must be used so that holes are not timed at too-short intervals.

The mucking crew works on the day shift. The first thing they do is clean up all fly rock and push the muck into a large pile at the face with a D-6 Caterpillar bulldozer.

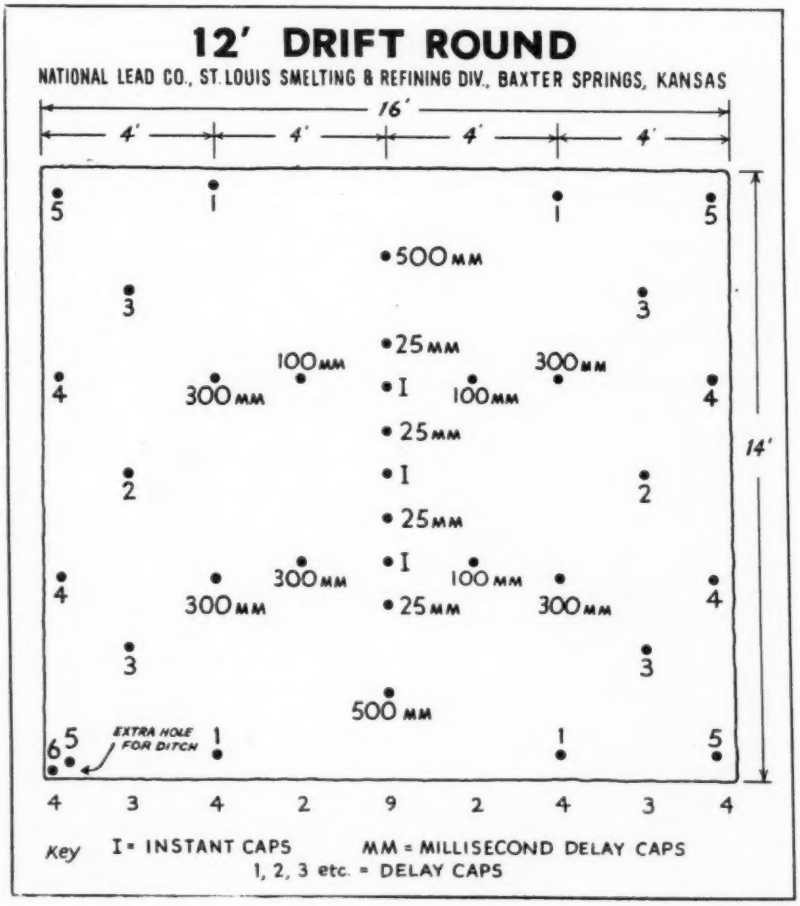
One Loader—Two Trucks

The 104 loader has a 1¼-cubic-yard bucket and mucks out the 150 tons of broken rock in 2½ or 3½ hours. Twenty to 22 7½-ton loads are mucked alternately into a Koehring Dumptor or Dart truck equipped with a Landis hydraulic end-dump body. The trucks turn around at the closest truck turnout and back up to the loader. The broken rock is hauled about three-quarters of a mile and dumped into mined-out stopes in the northern section of the mine, if the crosscut is in waste, or hauled to the shaft and hoisted when it is in ore. The loaded trucks travel at speeds up to 20 miles per hour and make a round trip every 15 minutes. The truck roadbed in the crosscut is built up with broken rock to form a hard-packed surface above the water ditch which is along the southwest wall.

Ventilate Through Drill Holes

Forced ventilation of the long crosscut 360 feet underground is through nine 8¼-inch churn drill holes drilled from the surface at 125-foot intervals. Electrically powered blowers are set at the top of each hole, and air is exhausted through the four holes nearest the face with fresh air being blown into the crosscut through the other five holes. The system has worked so well that within 15 minutes after the Diesel equipment has been moved out there is no smoke. Tests taken at 15-minute intervals with a Safco Meter, whch uses a color comparison system, have indicated an average of only 0.002 percent carbon monoxide in the air.

Careful planning and adequate, well-timed supply of key items—heavy long-sash drifters, sharp bits, sufficient compressed air, large capacity, Diesel-powered, off-track loading and hauling equipment, and forced ventilation—have resulted in a low-cost crosscut with a minimum of labor.



HOW HUMPHREYS SPIRAL CONCENTRATOR is used IN MODERN ORE DRESSING PRACTICE

By Judson S. Hubbard,
I. B. Humphreys,
and Whitman E. Brown*

In *Mining World*, October 1943[1], the first commercial installation of Humphreys spiral concentrators was described; in September 1948[2], some plant operating data on a variety of materials was given with brief descriptions of several of the spiral plants which soon followed the initial installation by Humphreys Gold Corporation for concentration of chrome sands on the coast of Oregon.

Appproximately 4,500 spirals are now in use in numerous plants. Such operating experience and laboratory tests using a full size spiral on more than a thousand ore samples have fairly well defined the types of material suited to spiral concentration.

Description of Spiral

The Humphreys spiral concentrator, invented in 1943 by I. B. Humphreys of Denver, Colorado, is a helical conduit of modified semicircular cross section. Ground ore or sand and water are fed to the top, and, as the mixture flows downward, the heavier particles concentrate in a band along the inner side of the stream. Ports for the removal of the higher specific gravity particles are located at the lowest points in the cross section. Wash water, added at the inner edge of the stream, flows outwardly across the concentrate band. The width of concentrate band removed at the ports is controlled by adjustable splitters. Concentrate (or refuse, when speaking of fine coal cleaning) is usually removed from the upper portion of the spiral and middling from the lower. Ore tailing (or clean coal) is discharged from the lower end of the spiral conduit. This lower end discharge may be divided by an adjustable splitter into two products; in ore separation, a slime tailing and a sand tailing; in coal preparation, a clean coal product and a middling product. The concentrating action and position of products in the spiral are shown in Figure 1.

There are no moving parts and no power is required except for delivery of feed pulp and wash water to the spiral and for disposal of products and tailing.

Screen Size, Capacity, Water

Good concentration is generally made on pulps containing liberated heavy mineral particles between 8 mesh and 200 mesh. Size of low-gravity minerals is not critical and may range as large as 4 mesh without materially interfering with the grade of concentrate. Capacity of solids per spiral varies from 0.5 to 2.5 short, or net tons, per hour of new feed, the average being about 1.5 tons per hour per spiral. Pulp volume rate of 20 to 25 gallons per minute is average, depending on character of feed. Total water requirement varies from 15 to 32 gallons per minute for dilution of pulp and from 3 to 7 gallons of clean wash water.

Type of Ores

When the specific gravity difference of particles to be separated in the spiral approaches or is less than 1.0, separation is difficult. For example, separation is usually not satisfactory between fluorspar (3.2) and calcite (2.7). In treating ores containing several heavy minerals the spiral is used to make a bulk heavy mineral concentrate rather than to separate individual heavy minerals.

There are exceptions to the above generalizations because of difference in physical characteristics of ores. An example is the mica ores where the flakes are readily separated from the blocky gangue particles although there is little difference in specific gravity. Another example is the phosphate ores where conditioning of the feed with reagents creates a difference in specific gravity or size of particles so that the valued minerals are separated from gangue in the spiral.

While the experience gained over the last few years helps to determine the types of ore suited to spiral separation, it is desirable to conduct careful tests in a full size spiral on an ore which appears suited to this method before proceeding with plant installations. This can be done in some 50 laboratories located at schools of mining and government bureaus of mines in the United States, Alaska, and about 11 other countries. They have the closed cir-

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cuit test unit which includes a full size Humphreys spiral concentrator, and which is designed for testing numerous samples of different ores such as are usually received by government and mining school testing laboratories. Where a particular problem is under consideration in an operating mill, it is often possible to install a single spiral to run as a pilot unit continuously on the particular feed. This insures accurate information under varying operating conditions, such as rate of feed, pulp density and ratio of concentration.

Chromite

Oregon, Turkey, Cyprus, Philippine Islands

First application[1] of the Humphreys spiral concentrator was for concentration of chrome sands from an ancient beach deposit on the coast of Oregon commencing in March 1943. Thirty spirals were installed by Humphreys Gold Corporation to treat 1,000 tons of sand per day. Upon the opening of the Mediterranean to shipment of better grade chromite from Turkey, the Oregon sand concentration plant was shut down in December 1943.

In 1948, four spirals were installed at the Kavak chrome mine in Turkey, by Turk Maadin Sirketi, and have continued in use with satisfactory results. In 1948 also, four spirals were installed for chrome concentration by Cyprus Chrome Company, Ltd. on the island of Cyprus. Fifty spirals are going into service in 1953 in the chrome mill of Acoje Mining Company in the Philippines.

Rutile, Ilmenite, Zircon and Monazite

Jacksonville, Florida

In 1944, Humphreys Gold Corporation moved its dragline excavating equipment, the mobile screening and washing plant, the 30 spirals and the dewatering equipment over 3,000 miles by rail to Jacksonville, Florida, to recover the titanium minerals, rutile and ilmenite, from a sand deposit.[3] The deposit, located east of Jacksonville, about nine miles inland from the seacoast, had been worked for some time and an increase in production was needed. Mobile dragline excavators were substituted for the fixed mast dragline previously used for mining and the 30 spirals, supplemented by some 200 spirals manufactured in Denver, Colorado, were installed for the wet concentration of the heavy minerals, replacing

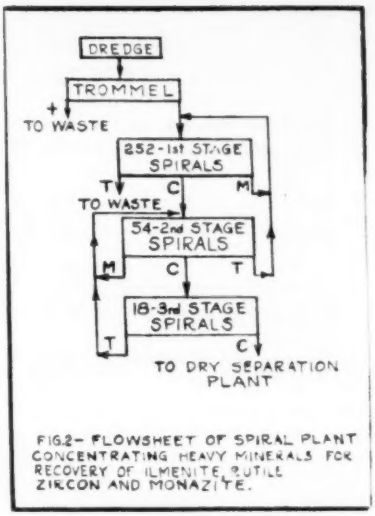
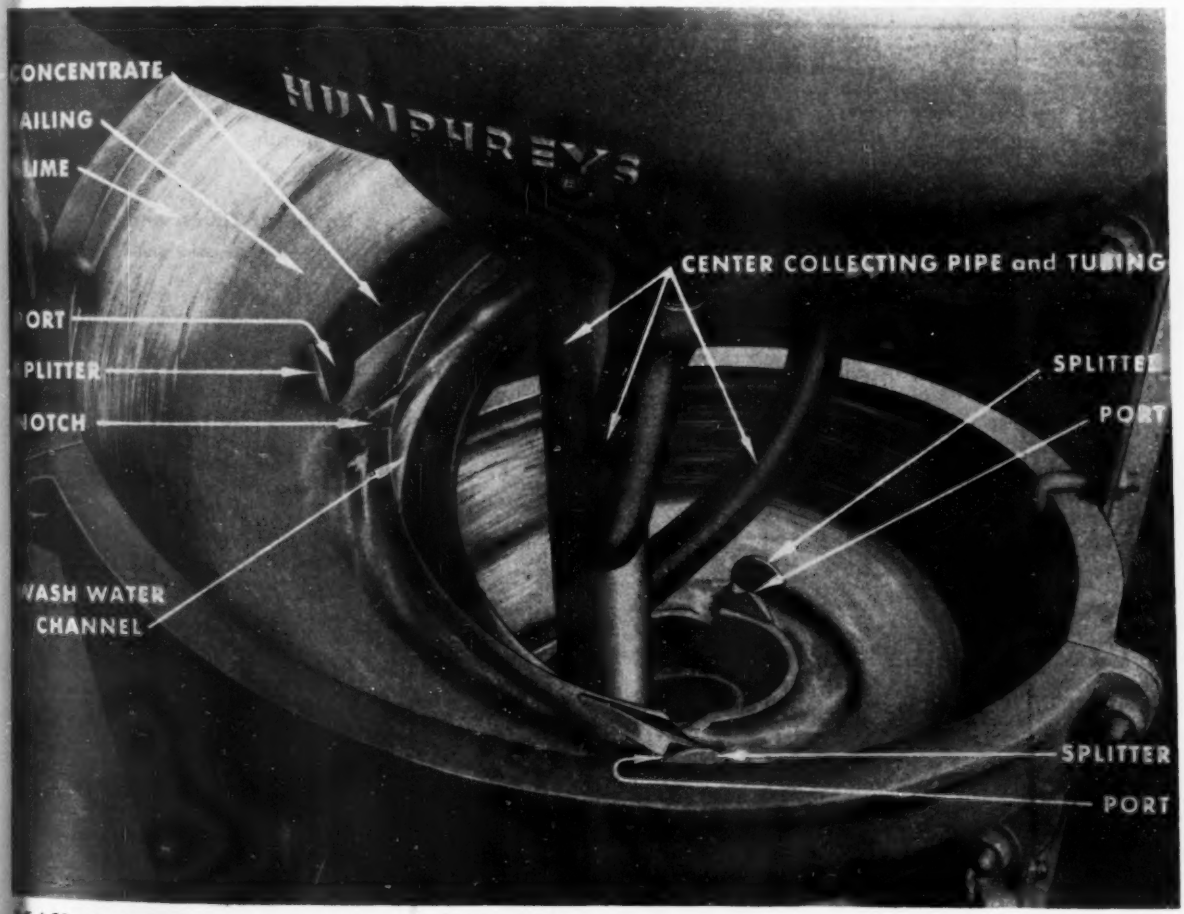
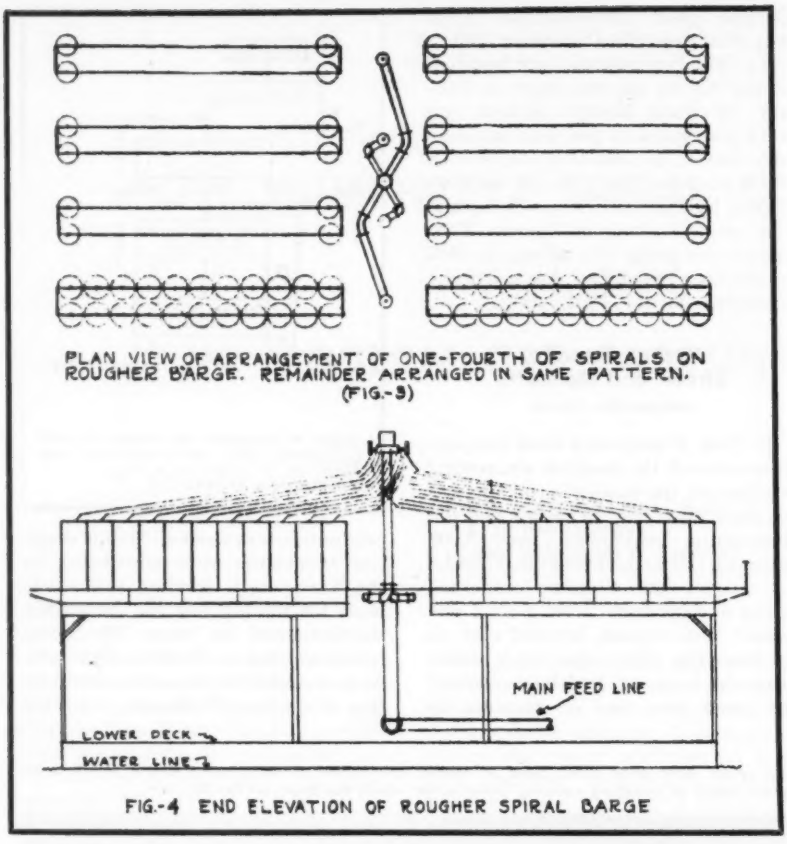


FIG.2- FLOWSHEET OF SPIRAL PLANT CONCENTRATING HEAVY MINERALS FOR RECOVERY OF ILMENITE, RUTILE ZIRCON AND MONAZITE.

Figure 1. Detail illustrates concentrating action of the spiral. Note wide black band of heavier concentrate entering upper outlet, which is set for a thick cut; also the narrower black band of middling entering lower outlet which has been set for thin cut.

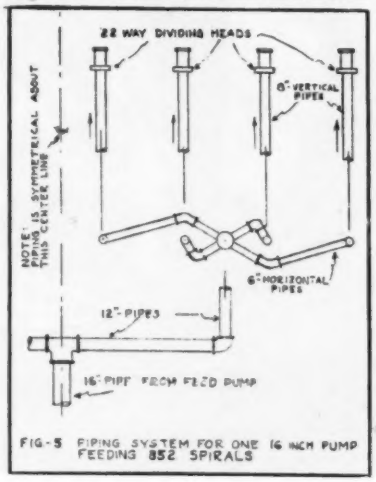



PLAN VIEW OF ARRANGEMENT OF ONE-FOURTH OF SPIRALS ON ROUGHER BARGE. REMAINDER ARRANGED IN SAME PATTERN. (FIG.-3)
MAIN FEED LINE
LOWER DECK
WATER LINE
FIG.-4 END ELEVATION OF ROUGHER SPIRAL BARGE

flotation cells and shaking tables previously used. Additional electromagnetic, electrostatic, and handling equipment were also required in the dry concentration plant. Production was soon doubled, and by later additions of spirals and other equipment, was still further increased. Operation of this plant, supplemented by what Australian rutile could be imported, provided an adequate supply of rutile during the war years for coating the welding rods which were so essential to the tremendous shipbuilding and armament program.

The spirals shipped from Denver were of a different model than the 30 spirals transferred from the Oregon chrome operation, being 24 inches in diameter instead of 30 inches. The new design gave slightly better metallurgical results and occupied less space with no decrease in capacity. The 30 spirals were therefore soon replaced. The 24-inch spirals installed at commencement of the Florida operation in April 1944 are still in use and no spiral section has been replaced or repaired in any way during this period of about nine years of continuous use. About 90,000 tons of sand have been run through each one of the rougher spirals. This is the longest and the best record with respect to maintenance and is mentioned to show that under fortunate conditions of material and water used the cost of maintenance of the spirals may be extremely low. Replacements in the feed distribution system have, of course, been made.

In 1946 production of zircon was commenced from the same sand deposit. The zircon production included working over the tailings from the rutile-ilmenite dry concentration plant which had been stored for that purpose. Zircon production required installation of additional spirals and a secondary concentration plant using electromagnetic and electrostatic separators. In 1949 production of monazite was added by installation of a cross-belt magnetic separator and intermittent use of the zircon plant equipment.


22 WAY DIVIDING HEADS
NOTE: PIPING IS SYMMETRICAL ABOUT THIS CENTER LINE
6" VERTICAL PIPES
6" HORIZONTAL PIPES
12" PIPES
16" PIPE FROM FEED PUMP
FIG-5 PIPING SYSTEM FOR ONE 16 INCH PUMP FEEDING 852 SPIRALS

Profitable production of these minerals over a period of nine years, during which prices varied widely, from a deposit averaging between 4 and 8 percent heavy minerals of which about one half were salable, was made possible principally by use of the Humphreys spiral concentrator. This upgrading is done so economically and ratio of concentration (20:1) is so great that more selective methods may be used in final concentration.

Flowsheet of the spiral plant is shown in Figure 2.

Four men and one supervisor per shift operate the 324 spirals of the ilmenite-rutile plant and the 60 spirals of the zircon plant. Operation is continuous except during holidays. Employees work 48 hours per week. Power consumption is about 164,000 kwh per month for the ilmenite-rutile plant and 22,000 kwh per month for the zircon spiral plant. The ilmenite-rutile spirals operate an average of 23 hours per day and the zircon spirals 13 hours per day.

The included table shows average operating cost of the ilmenite-rutile spiral department in recent months, treating an average of 267,000 tons per month.

Ilmenite, Zircon and Staurolite

Trail Ridge, near Starke, Florida

Some 50 miles distant, and still further inland, is the titanium mineral plant built and operated by Humphreys Gold Corporation for E. I. duPont de Nemours & Company, Incorporated which commenced operation in April 1949, with about three times the capacity of the above described Jacksonville plant.[4, 5] At the Trail Ridge plant, the 1,100 spirals used for concentration of heavy minerals are mounted on two barges floating in the dredge pond, but in other respects the spiral flowsheet is similar to that of the Jacksonville plant. Monazite is not produced at Trail Ridge. Production of staurolite for use in cement manufacture and for sand-blasting was commenced in the summer of 1952 by high-intensity magnetic separation from the titanium dry plant tailing. Humphreys Gold Corporation built and operates for its own account a plant for production of zircon recovered from the tailing of

the titanium dry concentration plant.

The Trail Ridge plant, handling about 20,000 tons of sand per day, has been described in various articles.[4, 5] It is mentioned here principally to point out a different condition respecting maintenance of spiral sections. The sands of the Jacksonville and Trail Ridge deposits are very similar, although the particle size averages slightly larger at the Trail Ridge deposit. But, apparently because of slightly different water conditions and particle size and shape, wear of spiral sections was very rapid at the Trail Ridge plant. Replacement of some of the sections first installed was necessary after a year and a half of operation. Spiral sections of chrome-white-iron and of Ni-Hard, and a molded rubber-lined spiral section were developed and are now available where high abrasion or corrosion appears likely. Life of these abrasion resistant spiral sections has not been determined. Cost of maintenance or replacement of spiral sections should not exceed one cent per ton of new feed, even under severe conditions.

It might also be mentioned here that the development of an economical method of distributing feed evenly to a large number of spirals has been a very important factor in the success of spiral concentration plants. For example, at the Trail Ridge, Florida plant approximately 1,100 long tons per hour of sand with water at a pulp density of about 35 percent solids is distributed evenly to 704 rougher spirals mounted on a barge 62 feet wide by 126 feet long. Arrangement of the spirals on this barge is shown in Figures 3 and 4.

Average Operating Costs Humphreys Gold Corporation's Ilmenite-Rutile Spiral Department, Jacksonville, Florida

Item	*Cost per ton of feed*[1]
Operating labor	$0.0113
Supervision	.0044
Power (@ $0.0127 per kwh)	.0078
Supplies	.0002
Maintenance	
Labor	.0037
Material	.0022
Service charges from other departments	.0071
Total	$0.0367

1. These costs do not include delivery of feed to trommel screen or disposal of tailing.

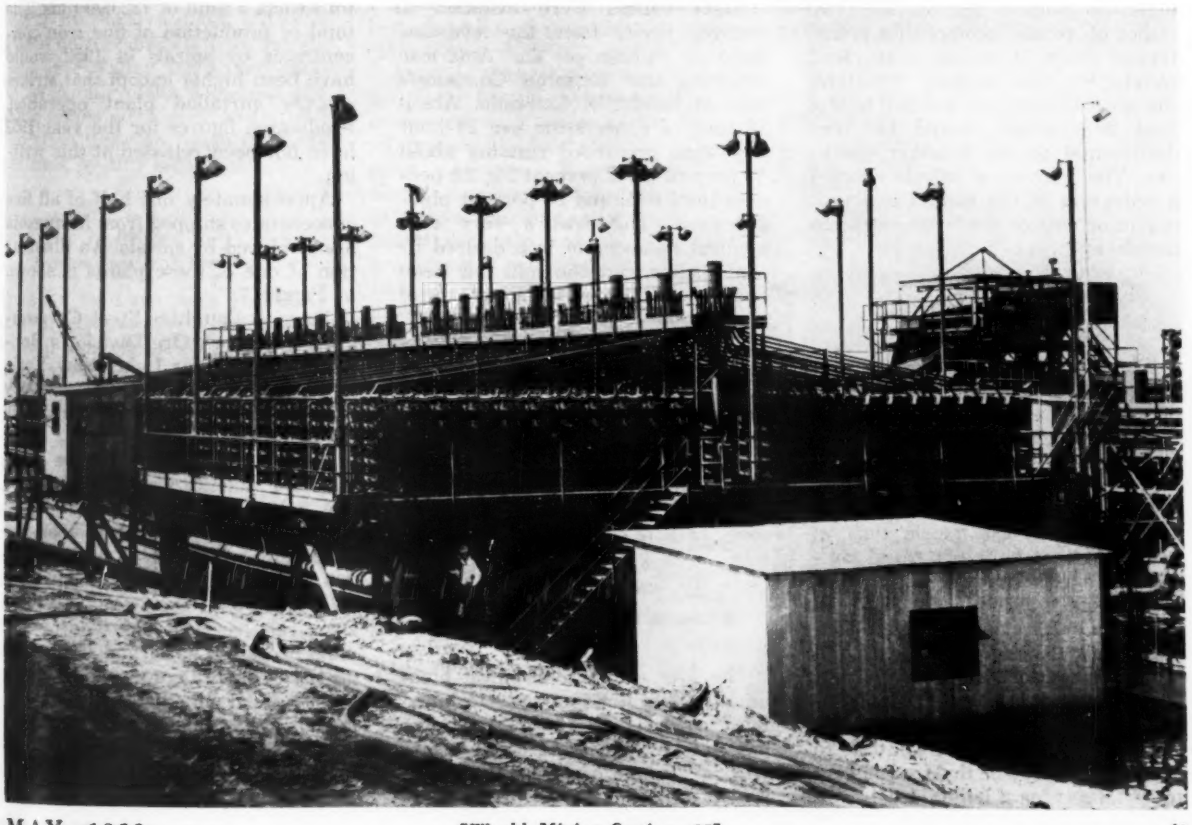
Ore received from the dredge is screened to remove trash and oversize, partially dewatered, and delivered to the two main feed sumps. Two 16-inch pumps draw from these sumps and deliver feed to the 704 rougher spirals. The discharge of each pump is divided between two 12-inch vertical pipes. A Humphreys dividing head with four horizontal 6-inch pipe size outlets is located on the top of each 12-inch pipe. The outlets are branch lines each containing the feed for two banks of 22 spirals. These branch lines are horizontal 6-inch pipes with pinch valves for closely equalizing and regulating the pulp flow to each two banks of spirals. An 8-inch vertical pipe is fitted to the end of each horizontal line and atop each 8-inch pipe is a 22-way Humphreys dividing head with 2-inch side outlets. Each 2-inch side outlet provides feed for two spirals. The dividing heads have no moving parts. Figure 5 illustrates the piping system for one 16-inch pump feeding 352 spirals. Figure 6 is a photograph of the rougher spiral barge at the Trail Ridge plant.

Ilmenite

Piney River, Virginia

Twenty-four spirals are used by Calco Chemical Division of American Cyanamid Company[6] as one of the units of the mill which prepare the feed for subsequent upgrading by flotation. The ore containing fine ilmenite in a clay matrix is screened

Figure 6. Rougher spiral barge at Trail Ridge, Florida plant.



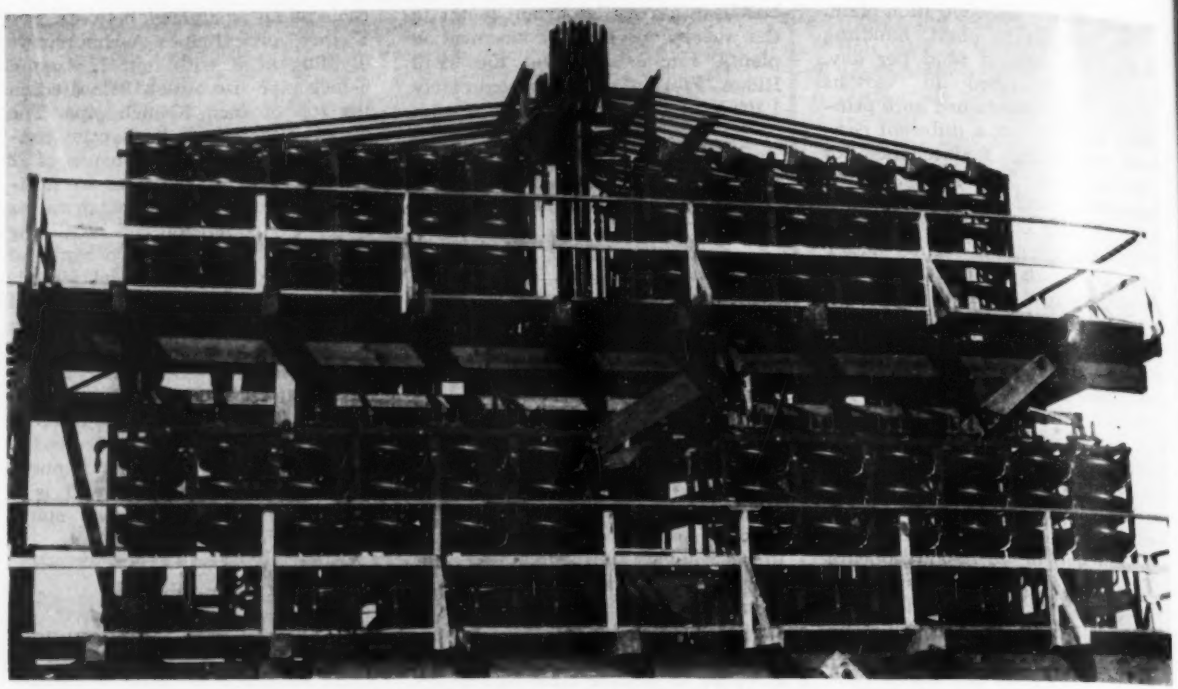


Figure 7. Typical medium size 2-stage spiral plant in Lake Superior iron district.

and classified. Classifier overflow is considered final tailing while the sands are delivered to a rod mill. The rod mill discharge flows to rougher spirals and then cleaner spirals which are in closed circuit with the rougher spirals. The two stages of spirals accomplish a rejection of about 50 percent of the feed weight, but what is more important, the spirals reject as a finished tailing mud balls which would be very detrimental to the flotation operation. The addition of spirals effected a reduction in the capital and unit operating cost of the former straight flotation process.

Lead-zinc Ores

Mechernich, Germany

While flotation is almost always preferable to gravity concentration of sulphide ores, 32 spirals have been installed to advantage in the mill of Gewerkschaft Mechernicher Werke in Germany. The spiral feed is a product from a hydrosizer at the rate of 1.5 to 2.0 metric tons of spiral feed per hour per spiral containing approximately 1.8 percent plus-32-mesh, 97.1 percent 32 to 200 mesh and 1.1 percent minus-200-mesh, pulp density varying between 30 and 35 percent solids. The spiral concentrate approximates 1.2 percent Pb and the tailing 0.2 percent Pb. The concentrate amounting to about 30 percent of the feed is sent to flotation for further treatment. Assay of spiral feed is not available at this writing but it is known to be very low.

Spiraling Flotation Mill Tailing

Eight spirals were installed to recover pyrite from the lead-zinc flotation tailing of the American Smelting and Refining Company's mill at Leadville, Colorado. About 50 tons of concentrate per 24-hour day were recovered running about 45 percent S, 47 percent Fe, 2.8 percent Insoluble, and 86 percent plus-200-mesh. This was a very economical recovery of iron desired by the smelter, but the mill has been temporarily shut down from lack of ore.

The Climax Molybdenum Company at Climax, Colorado has used 128 spirals for recovery of tungsten, pyrite and tin values from its molybdenum flotation mill tailing since 1948, and, incidental to general expansion of plant capacity, 240 additional spirals were installed early in 1952.[7]

Iron Ores

Minnesota, New York, Michigan and Sierra Leone

The first commercial spiral plant on the Mesabi Range was installed by The Cleveland-Cliffs Iron Company in 1948.[8] In the Lake Superior District there are now some 760 spirals operating in 10 plants, treating minus-⅛-inch intermediate ore and tailing deposits. These spiral plants cost approximately $1,000 per spiral installed. During the 1951 season the 760 spirals were estimated to have produced 950 long or gross tons each, a total of 722,000 tons. The total of production of fine iron concentrates by spirals in 1952 would have been higher except that strikes sharply curtailed plant operation. Production figures for the year 1952 have not been released at this writing.

Approximately one half of all fine concentrates shipped from Minnesota are produced by spirals. An illustration of one of these plants is shown in Figure 7.

Jones & Laughlin Steel Corporation, New York Ore Division's Benson mines, at Star Lake, New York, has installed 160 spirals for recovery of martite. This mine had previously produced only magnetite, using magnetic separators, and the non-magnetic martite went to tailing.

A spiral plant in upper Michigan began operation in May 1952 for treatment of minus-⅛-inch, plus-200-mesh iron ore. Two stages of spirals are used consisting of 40 and 20 spirals, respectively. The overall plant process is patterned after many of the Minnesota operations which embody heavy media separation followed by spirals which treat the particles too fine for the HMS operation.

In Sierra Leone, Africa, 256 mold-

ed rubber lined spiral concentrators have been installed in a mill to replace other equipment for concentration of specular hematite. It is expected that adoption of spirals will enable the output to be doubled within the same building because much less floor area is required by spirals as compared with the tables, vanner belts, and log washers of the previous installation.

Phosphate Rock

Florida

International Minerals & Chemical Corporation installed 154 spirals in its Achan plant in Florida for separation of fine phosphate from sand gangue. The phosphate and the gangue have approximately the same specific gravity. Although the spiral is generally considered a gravity concentrator, requiring some difference in specific gravity in the minerals to be separated, spirals are effective in this problem after conditioning of the feed with chemicals. Reagents are used which oil, and to some extent, agglomerate the phosphate particles, but do not affect the sand particles, thereby changing the size and apparent specific gravity relationship between phosphate and sand particles.

International Minerals & Chemical Corporation then installed 88 spirals in its Noralyn plant, followed this with an installation of 16 spirals in its Peace Valley plant, and then 20 in its Bonnie plant. Flotation and shaking tables were previously used for treating this size range of phosphate rock by this company.

Mica

Georgia and North Carolina

Thus far, we have been describing plants of comparatively large capacity and it might be said that spirals are suited only to installations for treating large tonnage. This is by no means the case, since the capacity of a single spiral is usually between 1.0 ton and 1.75 tons per hour, dependent on the type of material treated. About the only factor that might increase operating cost per spiral in a small plant as compared with a large plant is labor. One man per shift can attend about 100 spirals, so that in small plants part of the spiral operator's time should be applied to other duties. Several plants using small numbers of spirals were built during the last couple of years for recovery of fine mica in the southeastern United States.[9]

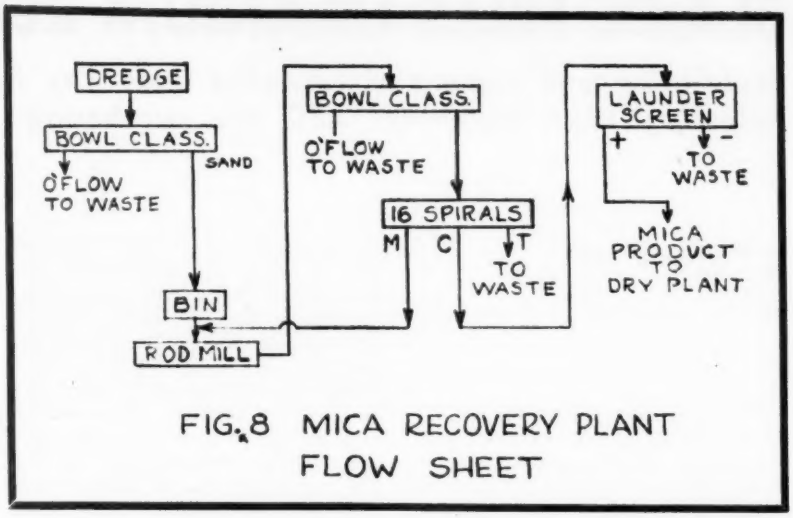


FIG. 8 MICA RECOVERY PLANT FLOW SHEET

The first commercial installation in mica treatment was by The Funkhouser Company at Hartwell, Georgia. The manner in which this plant started with just six spirals and enlarged to 16 spirals is a good example of the flexibility of a spiral installation.

There are three other similar installations recovering mica in the southeastern United States. The flowsheet of the Hartwell mica recovery plant is shown in Figure 8. Note that it includes a launder screen for dewatering and fine gangue removal. This screen has been found useful in similar applications in coal cleaning.[10]

Another interesting application of spirals is for the simultaneous recovery of mica and valuable heavy minerals at the Foote Mineral Company operation, Kings Mountain, North Carolina.[11] Here the spirals serve as a roughing operation for the heavy minerals and the flowsheet provides for roughing and cleaning of mica. Actually a third product is made containing spodumene although the upgrading of the spodumene is done by removal of mica and the heavy minerals—cassiterite, columbite, monazite, rutile, pyrrhotite, and pyrite.

Barite

England

Another example of a small spiral installation is that of three spirals by LaPorte Chemicals, Ltd., Westmoreland, England in February 1950 for barite concentration. The company added six spirals in 1952.

Fine Coal

Pennsylvania

Two plants of The Hudson Coal Company of Scranton, Pennsylvania, have been cleaning minus-¼-inch anthracite coal for several years with very good results.[12]

It should be noted that two basic spiral models are made, one for beneficiating ores and the other for cleaning fine coal or minerals of less than about 2.7 specific gravity. This should be particularly kept in mind if spiral cleaning tests are made on fine coal, since many of the laboratories which are equipped with Humphreys spiral concentrator test units have only the model used for beneficiating ores and cannot obtain best results with that model in the cleaning of fine coal.

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BLACK HILLS URANIUM REPORT

Exploration and mining of carnotite underway in Craven Canyon District following 1951 discovery; AEC ore purchasing depot speeds production

By Russell L. Wood
Mining Engineer
Livingston Uranium Corporation
Edgemont, South Dakota

The Edgemont mining district of South Dakota is one of the newer uranium producing areas in the United States. This district centers in Fall River County, in the southwestern corner of South Dakota.

The principal uranium mineral found in the district is carnotite. $(K_2(UO)_2(VO_4) \cdot 3H_2O)$. The ore occurs in the Dakota and Lakota formations, of Cretaceous age. To date no ore has been reported from the underlying Morrison formation which is the main ore producer of the Colorado Plateau. Prospecting has been sketchy in the area, but it is believed that ore may occur at any level within the 600- to 700-foot combined thickness of the two formations.

The uranium bearing beds have been exposed in this area by the Black Hills Uplift and subsequent erosion. The Dakota and Lakota formations are exposed around the entire perimeter of the Hills, but with the exception of the Edgemont district and an area in Wyoming near Newcastle and Sundance, no further uranium discoveries have been reported.

Ore bodies found to date are smaller, and uranium mineralization is more spotty than found in Colorado Plateau mining districts. The ore, however, has a much lower uranium-to-vanadium ratio, about 1 to 2 in comparison to typical Plateau ratio of 1 to 10. This means that the miner has no appreciable income from vanadium and the uranium must carry all the cost of production. Vanadium at $0.31 per pound is an important revenue for Plateau producers.

Prospectors Extend Area

The initial discovery of uranium in the area was made in the fall of 1951. Specimens of rock taken from Craven Canyon were assayed and identified as carnotite. Claim staking began almost immediately after the mineral had been identified, and has continued until there is scarcely a square foot of open ground within the area of known occurrences. At the present time, the district extends for approximately 12 miles in a northwest-southeast direction, and is as much as four miles wide in some places. The limits are being expanded constantly as more prospecting is being done.

The first ore shipments from the district were made early in 1952. By spring of 1952, several small operations were producing ore. Initially, the lack of ore purchasing facilities within reasonable distance prevented the mining of anything except high-grade deposits.

Work began on a government buying depot in July 1952. The station began buying and stockpiling ores on December 1, 1952. The presence of a local market for ores is expected to greatly increase production in 1953.

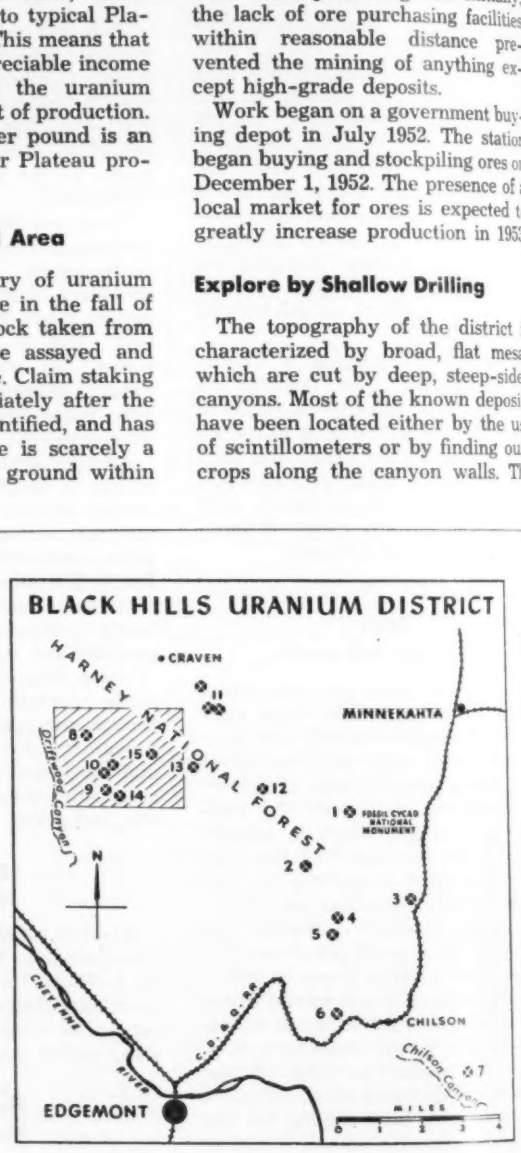
Explore by Shallow Drilling

The topography of the district is characterized by broad, flat mesas which are cut by deep, steep-sided canyons. Most of the known deposits have been located either by the use of scintillometers or by finding outcrops along the canyon walls. The

LEGEND —

Location of uranium mines and claims in the Edgemont-Craven area of South Dakota are shown on this map. The shaded area is where the United States Atomic Energy Commission is currently diamond core drilling a minimum of 20,000 and a maximum of 30,000 feet to gain further data about the size, grade, location, and attitude of uranium mineralization. The key to the map numbers follows:

Map Number	Claim or Mine Name	Owner or Operator
1.	Rip Snorter Group	Sodak Mining Company
2.	Holdup Group	United States Vanadium Company
3.	Gould Property	Edgemont Mining Company
4.	Lion Group	Barker and Howell
5.	McKnight Group	Livingston Uranium Corporation
6.	Gull Lease	Livingston Uranium Corporation
7.	Bell Mine	——
8.	Coal Canyon Mine	Sodak Mining Company
9.	Virginia C. Mine	Edgemont Mining Company
10.	Road Hog and Ridge Runner Mines	Sodak Mining Company
11.	Homestake Group	——
12.	Frank Albright Claims	——
13.	The historic spot where the first discovery of uranium was made in South Dakota	
14.	South View Group	Schuh, Weir, and Henderson
15.	Grass Flat Mine	Edgemont Mining Company



flat, treeless mesas are ideally suited for exploration with wagon or diamond drills, and some orebodies have been located in this manner.

The depth of drill holes is usually determined by the depth from which the ore can be economically mined. This does not exceed 30 to 40 feet in most instances, although some drilling has been done to depths of about 100 feet. Drill holes are commonly bottomed in a black shale which marks the bottom of most ore horizons.

Wagon drill cuttings are collected in simple sampling devices, usually a pail or tub cut so as to pass around the drill rods. The cuttings are examined visually, tested with a Geiger counter or scintillometer, or, rarely, assayed. Exploration holes are spaced from 50 to 100 feet apart on a rectangular pattern.

When mineralization has been picked up by a drill hole, the spacing pattern is closed in to aid in estimating tonnage and grade for mining. If sufficient ore is found to warrent mining, the overburden is stripped with a bulldozer and mining is started. In some instances underground mining may be done to recover ore found by wagon drilling.

Sodak Largest Producer

Recent activities in the district have been confined to the operations of three companies; the Sodak Mining Company, the Edgemont Mining Company, and the Livingston Uranium Corporation.

LEFT: Russell L. Wood. CENTER: Charles Bruner, manager, United States Atomic Energy Commission ore buying depot, Edgemont, South Dakota. RIGHT: Harold Duncan, (left), driller, and Clyde Boyle, manager, Sodak Mining Company, stand in front of a Sodak test drill.

The Sodak operations are a joint enterprise by the Sodak Mining Company and the Ortmayer Mining Company with headquarters in Grand Junction, Colorado. Clyde Boyle, manager of Sodak, is in charge of the Edgemont operations. The company operates one underground mine and several stripping operations.

The underground mine, the Coal Canyon mine, is the largest operating underground mine in the district. The orebody was blocked out by surface drilling and mining started from an adit in the adjacent canyon wall. Drilling is done with jackhammers mounted on airlegs, and the ore is hand mucked into a shuttle-car. The ore is then dumped onto a stockpile to await shipment to the buying station.

The surface operations of the Sodak Mining Company are typical of others in the district. Overburden is first stripped with a bulldozer to uncover the ore. If the orebody is small and spotty, mining may be done entirely by hand methods. Usually, however, the ore is drilled with jackhammers and blasted for loading with a tractor-mounted loader.

The Edgemont Mining Company is operated by E. J. Brockman and Arthur Ludwig. The company controls a large group of claims throughout the district. Several small orebodies are being mined by stripping methods.

LEFT: This front end loader in the Sodak Mining Company's surface mine loads ore directly into truck. The same loader was used for stripping the shallow sandstone overburden. RIGHT: Dumping a shuttle cart load of waste from the Coal Canyon mine of the Sodak Mining Company. Mining methods, equipment, and technical staffs from Colorado have played an important part in developing South Dakota's uranium deposits.

LEFT: Long hole prospecting with a dry wagon drill. The drilling unit is self-contained with the compressor on the back of the "half-track." Moving over rough terrain presents no problems. ABOVE: Panoramic view of the United States Atomic Energy Commission's ore buying station at Edgemont.

Livingston Leads in Exploration

The Livjngston Uranium Corporation has two deep-hole wagon drills and one diamond drill engaged in exploration in the district. The diamond drill is used to correlate the information obtained from the wagon drilling, and to provide cores for rock study. Some underground exploration is done by the company to investigate horizons too deep for economical drilling.

In addition to the operations already mentioned, there is intermittent production from a few smaller organizations. Typical of the latter are the South View group operated by Henry Schuh, C. E. Weir, and L. H. Henderson, and the Red Canyon property operated by Frank Albright.

During 1952, the United States Vanadium Company optioned a large group of claims, established a field office in Edgemont, had two wagon drills testing the claims, stripped shallow overburden, and trucked test shipments of ore to its Rifle, Colorado uranium-vanadium plant for metallurgical testing.

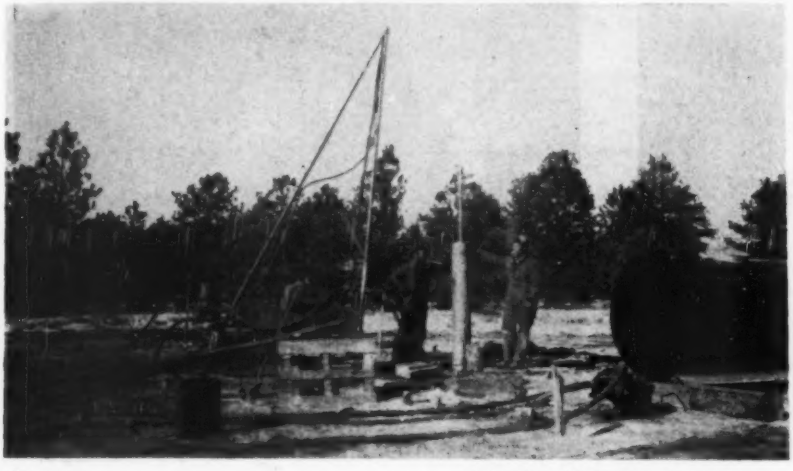
The Homestake Mining Company has also been active in the area. It secured mineral leases on the Lyle Griffith ranch near Carlile, Wyoming, and the Bailey ranch 3½ miles north of Aladdin, Wyoming. The company also staked claims in Crook County, Wyoming. These ranches and claims are on the western side of the Hills northwest of Edgemont. The company was also active in the Craven Canyon area.

Ore Buying Activities

Activities in the district are expected to be greatly expanded because of the opening of the government ore buying station. This installation is operated for the United States Atomic Energy Commission by the American Smelting and Refining Company. Charles Bruner of ASARCO is manager of the station. Uranium ore is bought under Circular No. 5, revised, of the Atomic Energy Commission.

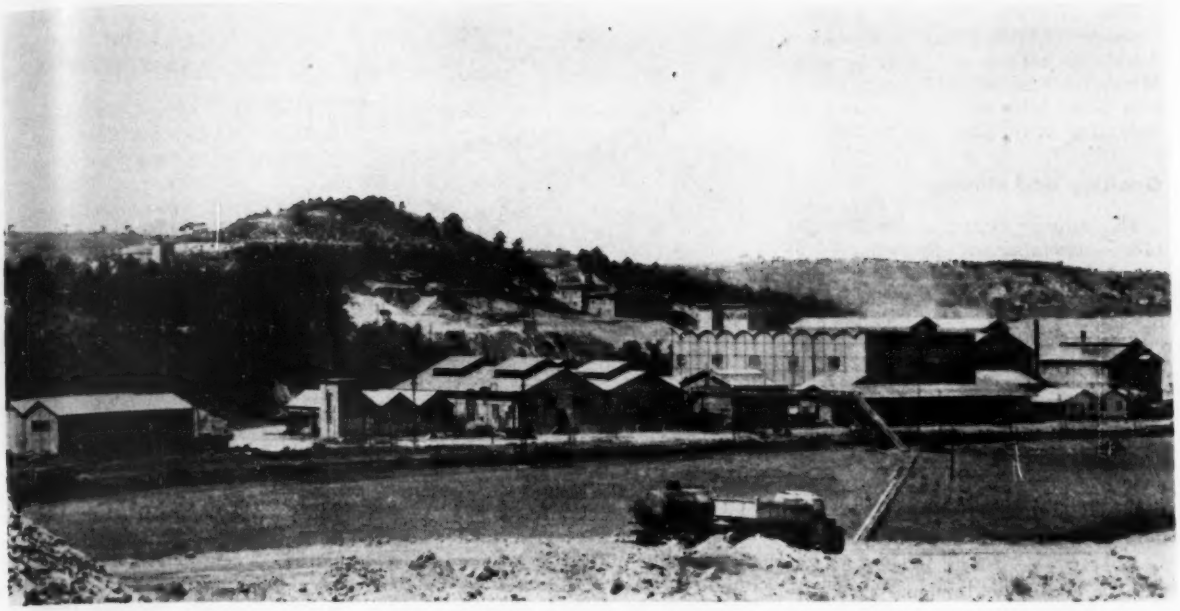
As each truckload of ore is delivered to the buying station, the load is weighed and two moisture samples are taken. The load is then dumped on the ground and held until a lot of approximately 35 tons has been accumulated. When the lot is completed, a trench sample of 300 to 500 pounds is taken and delivered to the sampling plant. The initial sample is then reduced using standard sampling procedures to yield the final samples for assay.

Drilling a 10-inch-diameter diamond drill hole on one of Livingston Uranium Company's claims. Engineer, Karl Lambertson (left), checks the hole for driller, Wrey Martinson.



AEC Diamond Drills

The United States Atomic Energy Commission called for contract bids until April 8th for diamond drilling a minimum of 20,000 and a maximum of 30,000 feet of hole in the area using three drill rigs. Drilling is to commence within 20 days after awarding of the contract. All holes will be vertically drilled from the surface. Average hole depth is estimated to be 133 feet in the first 20,000 feet of drilling. All the drilling will be in the Inyan Kara group (Fall River, Minnewaste, Fuson, and Lakota formations) with only sufficient penetration into the underlying Morrison formation to ascertain its identity. Core will be required for the entire hole.



General view of the 1,500-ton-per-day sulphur flotation plant and concentrate refinery of the Société Languedocienne de Recherches et d'Exploitations Minières at Narbonne, southern France.

NEW SULPHUR REFINING PROCESS

In France the Société Languedocienne mines 8.0 percent ore, concentrate it by flotation, and uses new refining process to make a 99.5 percent product

French Sulphur:

The rising world consumption of sulphur has been accentuated since the start of the Korean War. More demand plus the recent increase in sulphur prices, has caused a revaluation of sulphur mining and refining techniques. Those deposits which only recently were considered as too low grade for economic production will be important sources of supply in the future.

Problems of mining a low-grade deposit whose ore is difficult to treat have been successfully solved by the Société Languedocienne de Recherches et d'Exploitationes Miniéres at its Narbonne mine in Aude Province, southern France, only a few miles from the Mediterranean Sea. The firm's production of 1,500 metric tons of 99.5 percent sulphur from complex bituminiferous ore assaying only 8.0 percent sulphur has been of great economic interest and value to France. The techniques developed by the firm in 10 years of laboratory and pilot plant operation have now been fully proven in a commercial-scale plant which has been in operation since January 1951.

In 1941 the Société Languedocienne was formed to develop the Narbonne deposit which is one of four known low-grade native sulphur deposits in France. The others are Apt, Manosque, and les Campins.

The Narbonne deposit is favorably located in a vineyard area where large amounts of sulphur are used to kill oïdium.[1] The deposit was discovered in 1829 by Tournal, and a small amount of exploration had been done before World War II by the Société des Mines de Soufre de Malvezy. Société Languedocienne undertook an extensive geological survey of the area followed by an exploration program.

The open-pit mine with the Marion dragline stripping overburden at far right.

1. A form of minute fungi which causes one of the most destructive diseases of the European grape. —Ed.

This program developed a large tonnage of low-grade ore which could be mined by open pitting. Mining started in 1943 and a flotation plant was built and placed in operation in the first half of 1945.

Geology and Mining

The sulphur occurs as small nodules disseminated throughout a gangue of bituminiferous argillaceous schist, gypsum, and chalky marls. It is often found as microcrystalline blebs; it is whitish in color, but in rare instances small yellow-colored secondary crystals occur adjacent to faults or in small cavities.

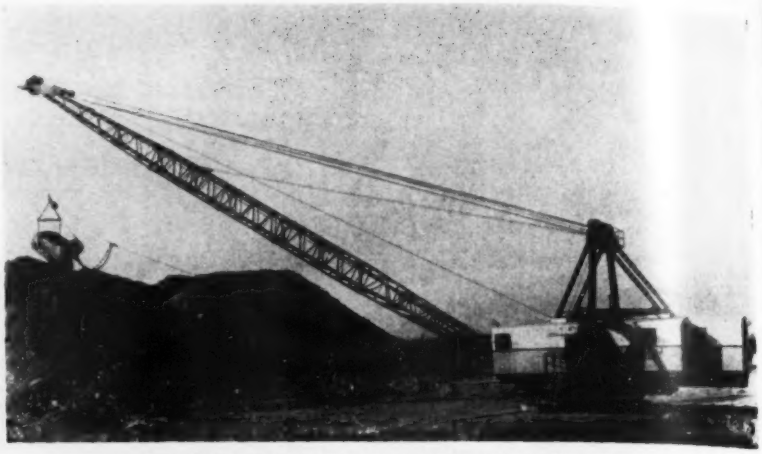
Ore grade mineralization is found over a thickness of 40 to 60 meters in a very large monoclinical fold dipping 10° to 15° to the west. A steeply dipping normal fault with a displacement of about 30 meters drops the northeastern section of the deposit. The eastern section is thinly buried by up to 10 meters of soil.

Sulphur Production in Metric Tons By Société Languedocienne For Fiscal Years from 1945 through 1952

Period	*Metric Tons*
1945[1]– 1946	2,000
1946 – 1947	3,500
1948 – 1949[2]	5,183
1949 – 1950	6,044
1950 – 1951[3]	8,474
1951 – 1952	14,847

1. Flotation plant placed in operation in first half of 1945.
2. Initial production of pure sulphur.
3. New refining plant started early in year.

Because of the flat dip and shallow overburden, the deposit is easily mined by open pitting. The top soil and blasted rock capping are stripped with a Marion 7200 walking dragline equipped with a 5-yard bucket and a 137-foot-long boom. The ore is drilled, blasted, and loaded into one of 12 10-ton trucks by either of two shovels with one-cubic-yard buckets. Waste inclusions are loaded separately into the trucks by the shovel operator and hauled to the waste dumps. Ore is hauled directly to the nearby concentrating plant.



Back casting overburden with the Marion 7200 walking dragline.

Crushing and Grinding

Trucks dump directly into a primary storage bin from which the ore is conveyed to a stationary grizzly. Oversize is crushed to minus-4-inches in one of two jaw crushers which have a combined capacity of 100 tons per hour. Grizzly and crusher undersize are stockpiled. This stockpile assures continuity of milling when mine production is low or the crushing plant is being repaired. Stockpiled ore is reclaimed by a drag scraper and screened at ⅝-inch. Screen oversize chutes to either of two hammer mills.

Primary grinding is in two eight-foot conical ball mills operating in closed circuit with one Akins duplex classifier. Akins overflow goes to the flotation conditioner and sand to a conical regrind mill in closed circuit with two rake classifiers. Sand from the rakes is returned to the regrind mill and overflow goes to the conditioner. Final grinding is to minus-40-mesh.

Conditioning and Flotation

Pine and gas oil are added to the pulp at the conditioner. A rougher concentrate assaying 40 to 50 percent sulphur is made in four banks of 10 Denver No. 30 "Sub-A" cells.

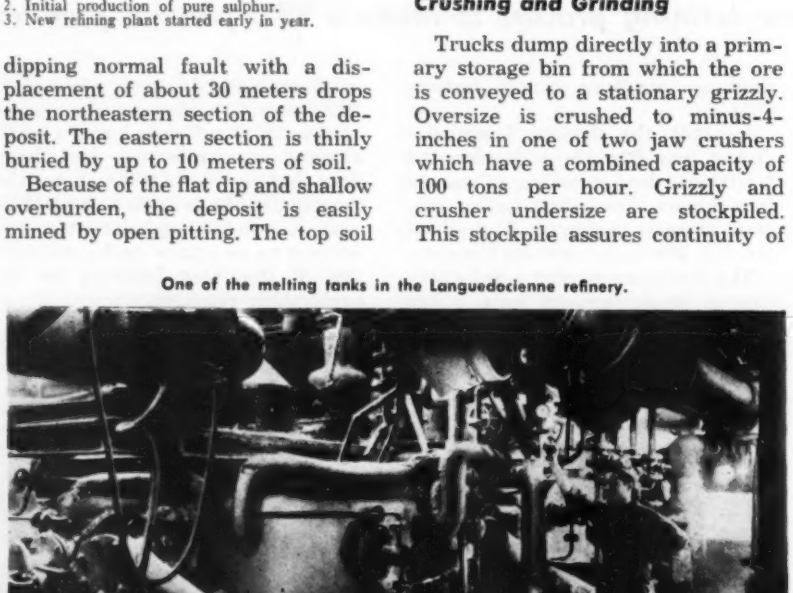
Rougher concentrate is screened on a 60-mesh screen. It has been found that the plus-60-mesh fraction is nearly pure sulphur and will not float in the cleaning cells so it is sent directly to the concentrate thickener. Cleaning and recleaning are done in 43 cells. Cleaner cell middling is recirculated to the head of the rougher circuit and the recleaned concentrate is sent to the thickener.

Flotation Difficulties Overcome

Flotation of Narbonne sulphur has proved to be particularly difficult because of the argillaceous gangue and extreme fineness of a large portion of the sulphur. The impossibility of desliming necessitates flotation in a very dilute pulp (about 250 grams of ore per liter of water in the rougher cells) and the use of large amounts of reagents.

Concentrate assaying from 75 to

One of the melting tanks in the Languedocienne refinery.



80 percent sulphur is thickened in a 40-foot Dorr thickener, and the underflow filtered on a drum-type filter.

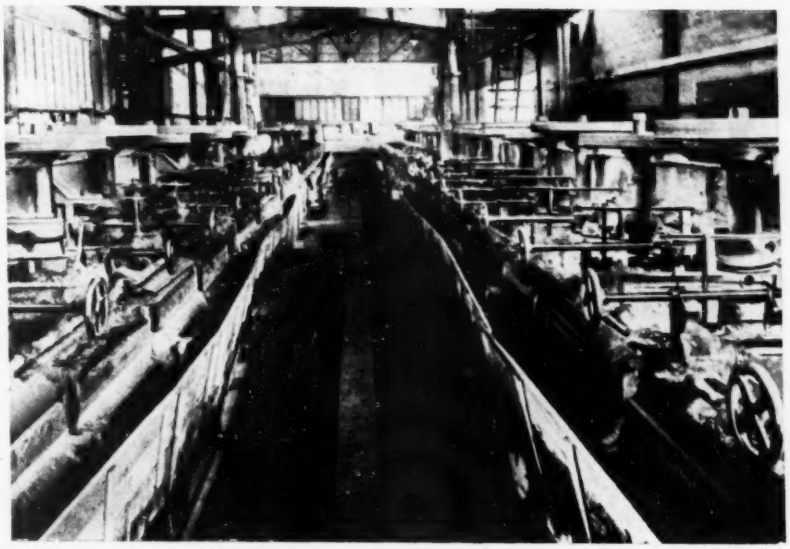
It has never been possible to make a marketable sulphur concentrate by flotation, i.e. one assaying a minimum of 98 and preferably 99.5 percent. Consequently, methods of raising the grade of flotation concentrate have been the subject of much laboratory and pilot plant research at Narbonne. Until 1949 the best and most simple process evolved was that of filtering molten surphur. Filter cake was distributed to melting tanks specially built to insure high calorific efficiency and to prevent frothing. These steam-coil-heated tanks each had a melting capacity of four tons per hour of filter cake. Molten sulphur from the tanks was pressure filtered and the filtrate crystallized as refined sulphur. This method was disadvantageous because small gangue particles remained in suspension in the molten sulphur and, therefore, the final product was low grade. Residue was also high in sulphur which could not be separated by flotation.

Perfect Refining Method

To overcome these difficulties, the Société Languedocienne developed a new refining process and built a commercial-scale plant which went into operation in 1951. In the process the gangue particles, which are in suspension in the molten sulphur, are agglomerated by the addition of a reagent. Agglomeration is dependent on temperature, contact duration, and, most importantly, upon proper agitation of the molten mass. Difficulties in finding a suitable agglomeration reagent were solved and the one now in use is cheap; has no corrosive effect on the steel tanks; yields no obnoxious fumes thus permitting open air processing; does not react with the chalky and argillaceous gangue; and is easy to recover for reuse.

After gangue agglomeration, the molten mass is screened on a perforated plate with 0.157-inch-diameter holes. Undersize is highgrade sulphur concentrate and the oversize is agglomerated gangue with inclusions of sulphur. Oversize is washed to recover the agglomerating reagent for reuse and returned to the flotation circuit where the sulphur is recovered.

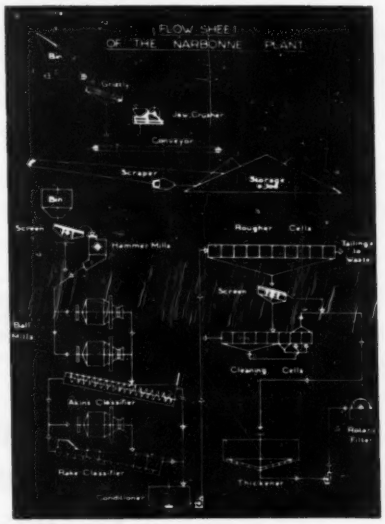
The bitumen which discolors the sulphur is not removed by flotation or purification so the next step in refining is to remove the bitumen by absorption. Sulphur is intimately mixed with an absorbent bleaching clay which removes the organic discoloring matter. The dirty clay is filtered off to obtain a final concentrate of yellow sulphur.



The rougher flotation circuit showing part of the 40 Denver "Sub A" No. 30 cells.

Recoveries and Costs

Treating an 80 percent sulphur concentrate, the Languedocienne refining process makes a 99.5 percent product with a 96 percent recovery. Based on an output of 2,000 tons per month, costs and material for producing 1.0 ton of pure sulphur are: *Operating,* reagents and supplies, $1.15; 0.9 ton of steam at a pressure of 14 kilograms per square centimeter; 45 kilowatt hours of power; and 2.00 man hours of labor. *Maintenance,* supplies $0.43; and 0.7 man hours of labor. Of greatest importance has been the successful production of high-grade sulphur from the refractory low-grade Narbonne ore.



Treating Other Ores

So successful has the Narbonne plant been that sulphur miners in all parts of the world have become interested in this process for treating their ores. To date, laboratory and pilot plant scale tests have been made on ores from Italy, Greece, Turkey, Argentina, and Ecuador. The process has proven so far to be applicable to all ores tested. For those deposits which have a sulphur ore grade of 70 percent or higher, the Languedocienne process is a one-step refining method. However, the greatest field of application seems to be in refining concentrates from those ores from which a high-grade flotation concentrate cannot be made. In this connection, an important increase in total recovery can be achieved by making a higher flotation recovery with a consequent lessening of concentrate grade because the refining method with its high recovery is applicable over a wide grade range.

Higher Overall Recoveries

Test results on two ores show the economic importance of the new refining process. While the initial plant cost is somewhat higher, the increased recoveries will more than amortize the extra cost within 18 months of operation. For an Italian ore which could be floated to produce an 85 percent concentrate for refining, an overall recovery of 94 percent can now be achieved. By the filtration method, only an 82 percent recovery would be possible.

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NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

The new Kaiser 600-ton-per-hour beneficiation plant is being built in the flat area midway between the Grey Eagle ore body and the North and South ore bodies. This picture was taken from the South ore body and from right to left shows a truck dumping at new crusher, the long belt conveyor and stockpile tunnel, and railroad car loading bins. The top of the Grey Eagle ore body has been cut out of the mountain in the background. The light colored benched area is actually the hanging wall.

EAGLE MT. IRON MINE EXPANSION

Kaiser Steel Corporation is Mining North and South Ore Bodies, Building Beneficiation Plant To Use Magnetic Separation and HMS Concentration

Steel for the growing west is the pledge of the Kaiser Steel Corporation. To keep this pledge, Kaiser is now spending $62,000,000 to increase steel ingot capacity at its Fontana, California works by 152,000 annual tons.

More steel requires more iron ore so Kaiser is simultaneously spending $3,000,000 for Eagle Mountain iron mine expansion—expansion which necessitated purchase of one new 150-B all-electric shovel with a 5-yard dipper to load the heavy ore, three new 42-T churn drills, three new 30-ton Diesel trucks, two new 150-ton Diesel-electric railroad locomotives, and auxiliary equipment. To house additional mine employees, 96 two- and three-bedroom houses are being built.

Kaiser Engineers, a division of Henry J. Kaiser Company, designed and built the steel plant, auxiliary works, and Eagle Mountain mine facilities so it is not surprising that Kaiser Engineers is handling all phases of the expansion program.

North and South Ore Bodies

After mining about 4,500,000 tons of high-grade ore from the Bald Eagle mine (MINING WORLD, October 1950, pp. 14 to 18) the open-cut mine has reached a point where the next cut would make an open-pit mine necessitating up-hill trucking of ore to the present crushing, stockpiling, and rail loading facilities. Plans call for the eventual lowering of the crushing plant and when this is done mining can be continued with a gravity flow of ore. In the meantime, mining operations are being centered at the North and South ore bodies one half mile to the east of the Bald Eagle, and similarly located in relation to the railroad, but on the opposite side of the tracks. Stripping of the waste capping and ore loading from lower benches are simultaneously underway.

In 1952 Eagle Mountain produced 1,648,041 tons of ore. Increased ore requirement for the expanded Fontana works will be 2,200,000 tons at the 1952 ore grade. However, the plan is to mine a greater tonnage at Eagle Mountain; then to upgrade it by magnetic cleaning and HMS separation to raise the average grade about 4.0 percent to 55.1 percent for blast furnace feed. For the mine, this program will mean that lower grade ore can be mined. Less selectivity in mining will reduce mining costs because post-ore andesite dikes slowed loading as waste was shovel-sorted and selectively trucked from the pit.

Transfer of mining operations and installation of the beneficiation plant necessitated a new ore handling system. A 66- by 84-inch jaw crusher was set on the west side of the mountain formed by the North orebody. Trucks dump directly into the crusher. Ore, crushed to minus-8-inches, is now stockpiled and delivered as required to railroad car loading bins by a 1,500-foot-long belt conveyor at 1,200 tons per hour. This conveyor is designed to be a permanent loading conveyor. A reinforced concrete tunnel has been built over the conveyor. In the future, concentrate from the beneficiation plant and direct shipping ore will be stockpiled over the tunnel and withdrawn to the belt

LEFT: The new crushing plant in far background and the 12,000-ton coarse ore stockpile below it. The belt conveyor visible at left extends under the stockpile and conveys ore to the railroad loading bins. The reinforced concrete structure in foreground is the foundation for the standard cone and shorthead crushers. RIGHT: Large and small drilling units at Eagle Mountain. In the background are three 42-T churn drills; in the foreground, three jackhammers. All are drilling waste capping over the North ore body.

Flexible Beneficiation

The new crushing and beneficiation plant now under construction by Kaiser Engineers will permit shipment of direct mine run ore in two sizes—minus-3-inch and minus-1-inch. Concentrate will all be minus-1-inch, plus-¼-inch in size. Products for shipping will be stockpiled in three separate piles on top of a long belt conveyor tunnel and drawn onto the belt for transfer to the rail shipping bin. With three separate stockpiles, plus regular primary crusher undersize, any of four sizes of products can be comingled so as to achieve any size proportion required by the blast furnace metallurgist. Grade can also be varied by blending the higher grade concentrate with direct shipping ore. When the plant is in operation, ore crushing at Fontana will be discontinued.

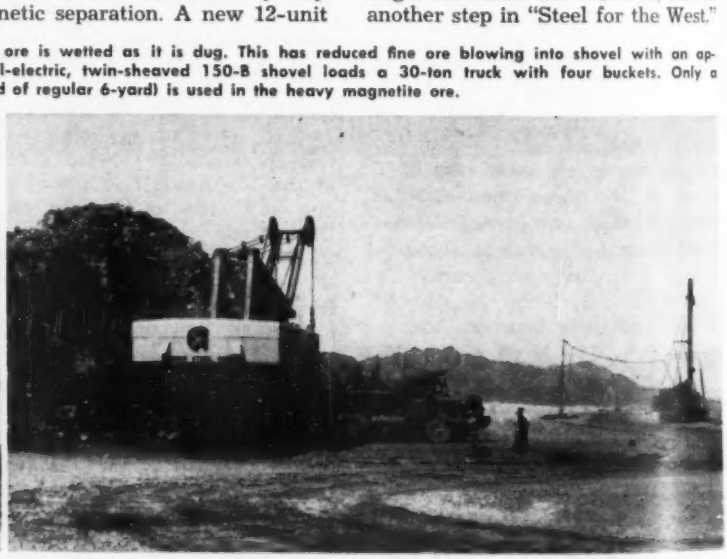
Primary crusher undersize, minus-8-inches, will be conveyed to a 3-inch bar grizzly at 700 tons per hour. Undersize can be conveyed directly to rail loading bins or to screens with the secondary crusher undersize. Grizzly oversize chutes to a 7-foot standard cone crusher set at 2¼-inches. Primary screens will have 1-inch openings. Minus-1-inch ore from screening will go directly to a 2,200-ton shipping stockpile, or, by the reversing conveyor, to four sizing screens. These screens will make a minus-¼-inch product which will either be stockpiled as lean ore, or stockpiled over the shipping conveyor to be drawn as required—a minus-½-inch, plus-¼-inch fraction as beneficiation plant feed; and a minus-1-inch plus-½-inch feed.

Magnetic and HMS separation

Eagle Mountain ore is 50 to 53 percent magnetite so a high-grade concentrate can be made by dry magnetic separation. A new 12-unit separator will treat 600 tons per hour of feed. The concentrate will be conveyed to the minus-1-inch, plus ¼-inch, shipping stockpile, while the rejects will be fed to the heavy media plant. The rejects will be wet screened at ¼ inch. Oversize will be treated in a drum separator with the washed sink product joining the magnetic concentrate for shipment. Float from the drum will be washed free of media, elevated to a storage bin, and trucked to waste dumps. Screen undersize will be thickened in a 100-foot thickener. The reclaimed water will be reused and the underflow pumped to tailing storage. No plans have been made to beneficiate the minus-¼-inch non-magnetic portion of the feed to the beneficiation plant.

The new beneficiation plant will give Kaiser a made-to-specification blast furnace feed, will increase Eagle Mountain ore reserves, and is another step in "Steel for the West."

LEFT: Wetting down the muck pile. Every bucketful of ore is wetted as it is dug. This has reduced fine ore blowing into shovel with an appreciable saving in maintenance costs. RIGHT: This all-electric, twin-sheaved 150-B shovel loads a 30-ton truck with four buckets. Only a 5-yard dipper (instead of regular 6-yard) is used in the heavy magnetite ore.



The M. A. Hanna Company is dewatering the Morton mine on the Mesabi iron range at rates up to 22,000,000 gallons per day. Part of the pumping equipment is shown in the foreground—two 8-inch Fairbanks-Morse centrifugals mounted on sump floats. Overburden is stripped with a 30-yard Bucyrus-Erie dragline loading into a mobile hopper which feeds a mile-long belt conveyor. The glacial remnants, too large for the hopper, are picked up by a 7½-yard shovel and loaded into 34-ton trucks.

DEWATERING ONE OF THE WETTEST OPEN PITS ON MESABI IRON RANGE

A labor similar to one of Hercules' mythical twelve, but with a reverse twist, is being performed at the Morton mine on Minnesota's Mesabi iron range by M.A. Hanna Company engineers. Hercules, so the ancient Greeks claimed, diverted two rivers to clean the Augean stables. At the Morton, quantities of water — enough to form at least two good-size rivers — are being diverted to bring into production a mine that has been closed nearly 40 years. At peak periods, the Morton pumps handle more water than would be required to service a city of 150,000 population — nearly 22,000,000 gallons per day. Though historians may neglect this modern effort as more prosaic than the Greek's, to mining men it means dewatering one of the world's wettest mines.

Abandoned to water

Development at the Morton started in 1910 when a vertical shaft was sunk under compressed air. The upper 187 feet of the shaft had a circular cross-section with a 21-foot inside diameter and 4-foot reinforced concrete walls. The remainder of the 350-foot depth was timbered. Even this protection from cave-ins proved unsatisfactory, however, and mining was discontinued in 1912 because of excessive water and sloughing ground; less than a quarter of a million tons of ore had been removed.

Reopened as a pit

The Morton again became active when the M.A. Hanna Company decided that ore zones could, with modern equipment, be profitably dewatered and stripped for open pit mining. In 1950, a Bucyrus-Erie 1150-B dragline carrying a 30-yard bucket was moved to the property along with a mobile hopper feeding a mile-long 48-inch belt conveyor to remove overburden that covered the ore zones to depths up to 240 feet.

When the first stripping cut was started, water in quantity was found within 5 feet of the surface. Three 1,500-gallon-per-minute deep well pumps were installed in the old concrete shaft and a drainage ditch, 60 feet deep, 200 feet wide, 1,500 feet long, and deepened at one end to form a sump, was cut along the south side of the stripping area. Metal floats in the sump carried sump pumps — later replaced by centrifugals when the water cleared — to carry water out of the drainage area. As water collected, additional sumps were dug and additional pumps installed; at peak periods as many as six were in service.

Restored by pumping

A pumping rate of 4,500,000 gallons per day must be maintained to stabilize the water level in the pit and, of course, much higher rates are required to lower this level. Newly installed units on sump floats include two 8-inch Fairbanks-Morse horizontal centrifugal pumps each with a rated capacity of 2,500 gallons per minute under a 300-foot head and driven by a 250-hp. F-M induction motor, and two 5-inch F-M centrifugals rated at 1,000 gallons per minute under a 030-foot head and driven by 100-hp. F-M induction motors. These units feed a 20-inch pipeline leading from the stripping area. The 1,800-gallon-per-minute turbine pump installed in the shaft will soon be replaced by a F-M Pomona deep well turbine pump with a capacity of 3,500 gallons per minute at a 350-foot head. This new unit will be driven by a vertically-mounted 400-hp. F-M induction motor.

To point up the importance of pumping at the Morton, it should be noted that continuous 24-hour-per-day pumping service allowed actual stripping to double the 700,000 tons estimated for the first year of operations.

Overburden at the Morton, largely glacial ground moraine, contains remnants too large to be handled by the mobile hopper. During draglining, these boulders are cast aside and left in the pit bottom to be picked up by Bucyrus-Erie 170B shovels, carrying 7½-yard dippers, and loaded into 34-ton Euclid rear-dump trucks.

HEATING SCREEN CLOTHS

A new method of heating screen cloth by electricity to prevent clogging or "blinding" when wet materials are screened has been perfected by Hewitt-Robins Incorporated.

Electrical current is carried to the screen by short insulated cables attached to copper bars which are located under the screen cloth and make direct contact with it. Worn screens can be replaced as easily as before addition of the heating equipment.

The new electrical arrangement eliminates power losses encountered in older systems where current is passed through steel or copper skirtboards along side the screen and above the screen cloth. The current distribution bars are shielded from abrasive action of material being screened, thus preventing weak or broken contacts due to corrosion of steel or copper parts.

Current going into the screen cloth is regulated by a Hannon variable step heater. Voltages range between 5 and 15 and amperes from 1,000 to 4,000. The heated screen dries out and bakes wet ore, clay, stone or other material as it tends to build up on the wires. This causes it to flake off instead of "blinding" the openings. The automatic cleaning speeds up the processing of wet materials, assures efficient sizing and prevents wear resulting from "beating" or other manual cleaning methods.

SHOVEL BUCKET SALVAGED BY CORRECT WELDING

This mining-shovel bucket, made of manganese and alloy steel, was discarded due to weld failure where mild steel deposits had been burned into the two reinforcing nibs at the top of the bucket. The mine owners, convinced that no method of repair could salvage the bucket and unwilling to chance a possible breakdown during operation, purchased a new one for $1600.00.

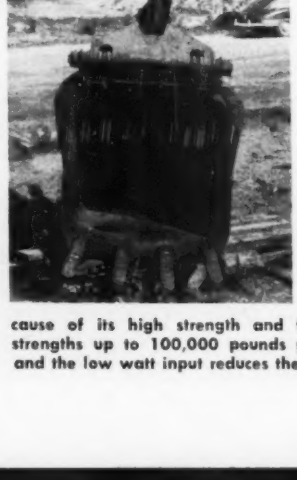
There are few unweldable metals, and rarely is equipment so badly damaged that it is beyond repair. Fragments can be joined together; worn portions can be removed and replaced with new ones, and cracks can be sealed and made serviceable again. Successful repair depends upon the knowledge of what to use, how to use it, and the ability to apply it.

The machine was reset to 80 amperes DC reverse polarity and a 1/8-inch EutecTrode inserted into the holder. A short to medium arc was maintained and 1-in. stringer beads were deposited by the skip welding technique. The beads were spaced as far from each other as practical to prevent a local build-up of heat. Each pass was chipped to remove slag, and peened to relieve residual stresses.

During the entire operation the temperature of the unit never rose above a comfortable hand heat. The deposits were dense, porous-free, and were quickly applied without spatter or undercutting. The repaired bucket has been in daily operation for over a year with no physical sign of wear on the repaired surfaces and no sign of weld failure.

A company welder examined the bucket, decided it was repairable, and received permission to weld it. This was in the belief that the bucket was scrapped and any improvement would be for the better.

The cracked faulty weld had to be removed and for this ChamferTrode was selected. This oxygenless chamfering and grooving electrode is manufactured by the Eutectic Welding Alloys Corporation. It is used with a standard welding machine of 300 amperes or more capacity. It is inserted in the holder in the usual way but when the arc is struck unwanted metal may be removed at incredible speed. The heavy coating on the electrode is reduced more slowly than the core and forms a tube through which the force is projected.



The machine was set at 300 amperes DC straight polarity and the defective weld removed in a fraction of the time necessary by conventional methods. The searing effect of the arc left the metal clean and bright, an ideal surface for welding, but so fast was the action that the part remained at a comfortable hand heat. This procedure was followed to remove the other defective weld metal and to vee the edges for subsequent welding.

The repair was to be effected with EutecTrode 680 because of its high strength and frictional wear resistance. Tensile strengths up to 100,000 pounds per square inch may be obtained and the low watt input reduces the heat of application to a minimum.

Muriel Sibell Wolle Describes

GOLD HILL, BOULDER'S FIRST CAMP

Summer visitors rather than miners fill the streets of the little mountain village of Gold Hill, Boulder County, these days, for although the sleepy little town retains many of its older cabins and frame buildings, and although the hillsides above and below it are covered by mine dumps and empty shafthouses, the mines themselves, except for occasional leasing activities, are quiet monuments marking an area which once teemed with activity. The first visitors to reach the high hilltop were prospectors looking for gold, which they found in the stream which runs through the present town.

In the summer of 1858 an emigrant train, plodding westward across the plains reached Fort St. Vrain at the junction of the Platte and St. Vrain rivers. Captain Thomas Aikins, a member of the train, and 15 or 20 others from it decided to leave the main party and strike out straight toward the mountains. After considerable travel, they reached the front range of the Rockies, and, on Oct. 27, entered the foothills at the mouth of Boulder Canyon near some red sandstone cliffs.

Since it was too late in the season to travel farther into the hills, they decided to camp for the winter at this spot which they called Red Rock. When the season remained unusually mild, the more restless men set out in search of gold. They entered the mountains by way of Sunshine Canyon, traveling along a ridge which lay between Boulder and Left Hand creeks. On January 15, after climbing 10 or more miles, the men reached a high plateau which they called Gold Hill, and the following day found gold in a creek bed they named Gold Run. Excited by their discovery, they returned to their friends at Red Rock. As soon as the news spread, 3,000 or more prospectors from the entire Pikes Peak region started for Gold Hill and were soon milling over the profitable ground.

Placer deposits on Gold Run were quickly staked and an estimated $100,000 was washed from the sands during the first season. Even with crude hand rockers, $70 to $80 a day was often recovered. During the first year a ditch several miles long was dug from upper Left Hand creek to the Hill to bring much needed water to the diggings.

Realizing that the placer gold came from some hidden source, the men began to prospect the surrounding gulches and hilltops until they found gold-bearing quartz on the hill above Gold Run. Captain J. D. Scott located the first fissure claim on a slope of Gold Hill. William Blore, M. L. McCaslin, and David Horsfal discovered the lode on top of the hill which became the Horsfal mine at the head of Black Cloud Gulch, just below Big Horn Mountain. Its rich surface ore was hauled down Aikins Gulch to Left Hand Creek to be washed in sluice boxes, since no stamp mill had as yet been built. Within two years, $200,000 was recovered from its deposits alone.

During the first years while pay dirt was plentiful, Gold Hill, the oldest mining camp in Boulder County, made its weight felt by helping to locate a new road between it and the valley town of Boulder via Sunshine Canyon and over Big Horn Mountain—a route still in use. Furthermore, a group of Masons received a charter on June 5, 1861 from the Grand Lodge of Nebraska establishing Rocky Mountain Lodge No. 8 at Gold Hill. On Feb. 22, 1862, the hardy miners "Resolved that we, the Miners of Gold Hill, in meeting assembled are emphatically opposed to the taxation of quartz or other mining claims and also to the County Clerk or Recorder having anything to do with our books or with recording claims and that we will continue to transact our busines as a Mining Community, so far as quartz claims are concerned as we have heretofore been doing."

A total of 909 claims were recorded by May 1861. By the time several stamp mills had been freighted laboriously across the plains to the mountains, and hauled in sections over impossible roads hacked through the timber to the 8,463-foot high camp, the Twins, the Alamakee, and other mines were ready to supply near surface ores to them. Most of the mills were constructed along Left Hand Creek in order to be close to water, although the first one, whose machinery was hauled from St. Joseph, Missouri, by ox teams, was placed on Four Mile creek, south of the camp.

In 1863 the owners of the Horsfal formed an association called the Union Company, erected a six-

The Horsfal mine from Big Horn Mountain with the Continental Divide in the distance.

stamp mill, and operated it "till it wore out." In spite of considerable experimentation, the milling processes installed in the several mills failed to extract the ore from the quartz, and, by 1865, after the pockets of free gold and the gulch placers were worked out and the mines quit paying, the men drifted away to other camps or turned to ranching in the vicinity of Gold Hill.

During the last half of the 1860's the camp was quiet; then in May 1873, Joseph Stepler and his partner, while gophering around on the Hill, became interested in a dark metal which was found in abundance all over the area and which was thought to be worthless. They had samples of it assayed and found it was tellurium. In one old prospect hole near the top of the mountain, they found considerable tellurium ore. For fear that the original locator might return and claim his property, they filled in the hole, stuffed a pine tree into it and dug a new hole nearby. This became the Red Cloud mine.

As soon as the character of the ore was known, a second rush to Gold Hill began and the discoverers of the Red Cloud had no trouble getting backers to develop their mine. Next the Cold Spring, which joined their property, was discovered, and these two mines became the principal properties in the district. By 1875 the Slide had been opened—a mine from which over $2,000,000 was recovered, while other important holdings included the Black Cloud, Victoria, Cash, St. Joe, White Cloud, and Times.

With the sudden influx of miners, the old camp on top of Horsfal Mountain was abandoned and a new townsite laid out on the ridge between Gold Run and Aikins Gulch, west of the mountain. During 1873, 30 new buildings were erected, including a store, hotel, postoffice and several boarding houses. Cabins began to appear along Gold Run and down into steep Aikins Gulch, which the men renamed Lick Skillet.

From 1879 to 1880 Gold Hill's population was 1,000 and every cabin in the town and the nearby gulches was full. The 1880's and 1890's were the best days of the camp and even occasional mine disasters, like the drowning of two men in the bottom of the shaft of the Cold Spring mine when water from the Red Cloud flooded the shaft, could not dampen the exuberant town for long.

In 1898 a mine railroad, the Denver Boulder and Western, known as the Switzerland Trail, ran up Four Mile Canyon from Boulder to Ward with a station west of Gold Hill, but although it was built to facilitate the shipping of ore and to reduce transportation costs, by the time it was completed, the peak of the mining boom was past. Even though the Cold Spring mine had 100 men on its payroll in 1899, and the Black Cloud group of 17 claims had a spurt of activity in 1902 when new methods of mining made ore running $20 a ton profitable to handle, mine production declined so rapidly during the 20th century that the railroad was abandoned in 1917 and Gold Hill became almost a ghost town.

However, its location was attractive and each year more and more tourists and visitors were drawn to its empty cabins which they speedily transformed into attractive summer homes. The town retains much of its early-day atmosphere for many original buildings are still standing—the schoolhouse, a couple of stores, several frame houses and the old Gold Hill hotel, built in 1873 by Mr. Wentworth of Denver and immortalized by Eugene Field in his poem "Casey's Table d'Hote." In this sturdy building, the round table on which Field wrote the poem is still preserved and is shown to guests.

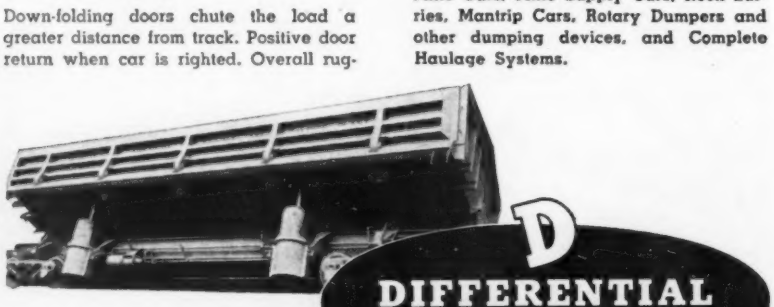
THE "WHAT" Nearly forty steel mills, here and abroad, have purchased Differential Air Dump cars in capacities ranging from 30 to 60 cubic yards (level load).

THE "HOW" Massive air cylinders on both sides power the two-way, 50° dumping action. Wide spacing of fulcrums contributes to riding stability. No locking mechanism — no accidental dumping.

Down-folding doors chute the load a greater distance from track. Positive door return when car is righted. Overall ruggedness and simplicity of design mean minimum maintenance.

THE "WHY" It all adds up to a "higher ratio of payload to dead weight," superior performance — and ultimately to a prettier picture on the operating statement. That's "why" more and more steel mills have put Differential cars on their "earn-roll."

Other Differential Products: **Locomotives, Mine Cars, Mine Supply Cars, Rock Larries, Mantrip Cars, Rotary Dumpers and other dumping devices, and Complete Haulage Systems.**



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SINCE 1915—PIONEERS IN HAULAGE EQUIPMENT

ACTIVITIES OF U. S. MINING MEN

Ira K. Hearn, Jr. is new industrial engineer for the western mining divisions of Kennecott Copper Corporation. He will make his headquarters in Salt Lake City and will work with the managements of Kennecott's four divisions in Utah, New Mexico, Arizona, and Nevada. Prior to his appointment, Mr. Hearn was assistant to **Charles R. Cox**, Kennecott president. **Frederick C. Green**, former assistant general manager of the Chino Mines Division, has been advanced to assistant general manager, Utah Copper Division. **Albert Kastelic** has been promoted to general hill foreman at the Bingham mine, succeeding **Richard H. Wiley**, who is going to the Philippines.

Guy N. Bjorge, general manager of Homestake Mining Company, Lead, South Dakota will retire May 12. Mr. Bjorge, who has been operating head of the largest gold mining operation in the western hemisphere for many years, will continue to serve as a director of the company. He is succeeded by **A. H. Shoemaker**, Homestake vice president who was formerly located in San Francisco.

Clyde W. Osborn is now head of the mining department of Kerr-McGee Oil Company of Oklahoma City, Oklahoma. Kerr-McGee has extensive uranium mining operation in the Lukachukai Mountains of Arizona and is interested in the construction of a treatment plant at Shiprock, New Mexico. Mr. Osborn previously was employed by the Western Machinery Company as a sales engineer in North and South America and Australia.

Charles Will Wright spent most of March visiting mines in Mexico and will be there again from April 15 to May 10. He is convinced that the risk of investment in Mexican mines is far less than generally believed. Changes in the high production and export taxes on mineral products are now being studied by the new administration to encourage such investment.

Dr. R. Genders of London, England, has been appointed metallurgical consultant to the Vanadium Corporation of America. Dr. Genders is deputy director of metallurgical research at the Royal Ordinance Factory at Woolwich, England.

RUSSEL B. CAPLES, manager of Anaconda Copper Mining Company's reduction department at Great Falls, Montana since 1941, has been elected president and director of Anaconda Aluminum Company. Mr. Caples succeeds **FRANCIS O. CASE** who resigned to become president of the Glen Alden Coal Company. Mr. Caples will make his headquarters in New York City, but will continue to manage the zinc contract negotiations of the Montana zinc plants.

MINERALS SECRETARY

FELIX EDGAR WORMSER, vice president of the St. Joseph Lead Company, has been appointed assistant secretary of the Department of Interior in charge of mineral resources by President Eisenhower.

His first mining employment after graduating from Columbia University in 1916 was at the Cornucopia Mines Company's gold mine in Oregon. While he has lived in the east for the last 30 years, he is well known to all western miners because of his annual speeches before them over the past 20 years at the Colorado Mining Association's conventions.

His latest project in behalf of the domestic mining industry was announced in Spokane, Washington on December 5, 1952 when he advocated a sliding scale stabilization import tax on lead and zinc to the annual convention of the Northwest Mining Association.

Mr. Wormser has been secretary, treasurer, and since 1947 president of the Lead Industries Association, is past president of the Mining and Metallurgical Society of America, and member of numerous industry advisory committees to World War II boards and agencies.

He is a keen student of economics, knows and appreciates the marketing problems of metals and minerals, and realizes the adverse affects on the mining industry when shortages, prices, or substitute materials force shifting of metal uses.

Recent travels abroad have vividly focused his attention on foreign developments and the necessity to maintain a healthy active-producing domestic mining industry.

G. A. Borgeson has been appointed manager of the safety and claims department of the iron mining division of the M. A. Hanna Company. He succeeds **P. A. Carmichael**, who retired April 1 after 36 years of company service. **Fred Sutter**, former superintendent of the Clifton mine in upper New York state, has been named claim manager for the Michigan district.

William L. Bell, Spokane, Washington mining engineer, has been elected present of Butte Highlands Mining Company. He succeeds **W. S. Norman** of Spokane, who remains on the board of directors.

Lewis M. Robinson has been named general manager of the Triumph mine of Triumph Mining Company at Triumph, Idaho. He succeeds A. H. Shoemaker who resigned to accept an appointment as general manager of Homestake Mining Company's mine at Lead, South Dakota. Mr. Robinson had been mine superintendent. C. C. Livingston, formerly mine manager, will take over the duties of mine superintendent.

Wayne Fowler has been named plant superintendent of the mill at Los Lunas, New Mexico, where he had previously been mill metallurgist. Mr. Fowler succeeds Coyne Hunt who died recently. The name of the company, Zuni Milling Company, has been changed to Fluorspar Branch, Shattuck Denn Mining Corporation.

Barney B. Greenlee, general manager of the Resurrection Mining Company, recently left Colorado for a short business trip to Las Vegas and Beatty, Nevada. **J. R. C. Mann**, executive of Newmont Exploration Company, which controls Resurrection and other western properties, recently conferred with company officials in the Leadville and Montrose, Colorado districts.

Andrew Fletcher, president of the St. Joseph Lead Company, has been making a tour of lead and zinc mines and smelters in Australia. On March 31 he made a special speech titled "An American Views the International Metal Scene" before the Australasian Institute at Melbourne, Victoria.

Four western mining men took part in the 25th annual meeting of the Lead Industries Association held recently in White Sulphur Springs, West Virginia. **Henry L. Day**, president of Day Mines, Inc. acted as chairman of the opening general session. **Paul Feddersen**, superintendent of Bunker Hill & Sullivan's Kellogg smelter; **F. L. Hallam**, assistant comptroller for Consolidated Mining and Smelting Company of Canada, Ltd; and **Miles P. Romney**, man-

OTTO HERRES, vice president of Combined Metals Reduction Company of Salt Lake City, Utah, has been elected vice chairman of the Mining Standards Board of the American Standards Association representing the metals group. Mr. Herres is chairman of the National Emergency Committee on Lead and Zinc, and also director and vice president of the Utah Mining Association. He has also served as chief of the lead-zinc branch of the D.M.A., and as advisor to the State Department on the Copper-Zinc-Lead Committee of the International Materials Conference.

ager of the Utah Mining Association, participated in a panel on lead mine production.

George S. Krueger, mine superintendent, and **O. N. Friendly,** engineer, have resigned from Park-Utah Consolidated Mines Company at Park City, Utah.

Simon D. Strauss has been elected a director of the American Smelting and Refining Company. He has been with the company since 1945 and a vice president since 1949.

Norman A. Stockett has retired as general mill superintendent, Southeast Missouri mills, St. Joseph Lead Company. He has been with the company since 1916, and was graduated from Montana School of Mines 1909.

John P. O'Keefe, assistant treasurer of the Braden Copper Company, has been named controller of the Utah division of Kennecott Copper Corporation. He succeeds **George A. Stoutter,** who has retired after 45 years of association with the mining industry.

Leo Mason was again named president of the Idaho Beryllium and Mica Company in Deary, Idaho. Other officers elected were **Samuel Swayne,** vice president; **John Carver, Jr.,** secretary-treasurer; **Harvey O. Hoff, C. V. Peckham, Glen L. Evans, O. W. Bunton,** directors. Mr. Mason and Dr. Swayne are also directors.

Odin A. Sundness is new vice president in charge of mining operations, Snyder Mining Company. He has been general manager of operations for the Minnesota firm since August, 1946.

Joseph J. Beeson, Salt Lake City, Utah consulting geologist, has been elected president of the Utah Geological Society.

Carson E. Wieland has been transferred from the Humphreys Gold Corporation Trail Ridge plant to the Du Pont operation at Grasselli, New Jersey. He is being replaced by **Amos M. Crowley,** who moved from the engineering department's main office in Wilmington, Delaware.

PETER BLACK has been appointed assistant to LANGBOURNE M. WILLIAMS, president of Freeport Sulphur Company. Until recently, Mr. Black had been assistant to HENRY H. FOWLER, director of the Office of Defense Mobilization, and had also been assistant to the N.P.A. and D.P.A. administrator.

John Treweek is new state inspector of mines for South Dakota, replacing **M. Clair Smith,** who has gone into private business at Lead.

William B. Hall is now a vice president of Vitro Chemical Company, Salt Lake City, Utah firm. He previously was manager of the Salt Lake uranium mill, and will retain this position.

The Mineral Resources Association of Central Idaho has re-elected **Howard Sims** president and **Joseph Ausich** secretary-treasurer. Other officers include **C. A. Bottolfsen,** first vice president, **Earl J. Soelberg,** second vice president. Directors include **Russell Walker, William Stanley, Ivan Taylor, Clint Gunderson, George E. Shoup, E. J. Perrin, Bill Swigert** and **Lew Carothers.**

New appointments to the faculty of the Colorado School of Mines include **Dr. Carl Gommel,** engineering staff; **Dr. John R. Douglass,** instructor in chemistry; **Robert L. Carruthers,** instructor in petroleum engineering; **Wilfred P. Hasbrouck,** instructor in geophysics, and **Richard P. Bobco,** instructor in mechanical engineering.

John G. Reilly, Jr. is new assistant mill superintendent of St. Joseph Lead Company's Edwards, New York operation. He formerly was at the company's mine in Bonne Terre, Missouri.

Josiah Work has taken over management of the Pocatello, Idaho elemental phosphate plant, Westvaco Chemical Division, Food Machinery and Chemical Corporation. He has been with the company since 1950.

Merton I. Signer has been advanced to the position of plant geologist and **E. C. Skinner** is now industrial engineer at the Potash Division of International Minerals and Chemical Corporation in New Mexico. Mr. Signer takes over the job left vacant by the recent resignation of **Charles W. Hicks. Howard J. Husing** has moved up from a driller in the mine department to a junior engineer with the mine engineering department.

Edward H. Denny, chief of the accident prevention and health division, Region IV, U. S. Bureau of Mines, has received a citation and gold medal for distinguished service, the Department of the Interior's highest honor. The award was presented in recognition of "nearly four decades of outstanding service in health and safety work."

Albert H. O'Neil has been elected assistant vice president of Freeport Sulphur Company.

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ACTIVITIES OF INTERNATIONAL MINING MEN

J. E. Klug is new mine superintendent at Radium Hill, South Australia. He formerly was affiliated with North Broken Hill, Ltd., New South Wales, Australia.

Charles E. Stott has resigned as director of the Foreign Expansion Division, Defense Materials Procurement Agency to accept an executive position with the Tsumeb Corporation, Ltd., Tsumeb, South West Africa. Prior to entering government service, Mr. Stott was employed for 20 years by the American Metal Company. **Stanton B. Keith** is now acting DMPA director.

George Schafer, general manager of Minas de Matahambre, Pinar del Rio, Cuba, recently made a short visit to mining operations in the western part of the United States.

T. R. Frost has been appointed chief analyst to the South Australian "Rum Jungle" uranium project, and **D. C. Bowditch** is senior analyst. In addition, eleven members of the Adelaide School of Mines staff have transferred to the Mines Department for assay work on the project.

Dr. G. P. Contractor, acting director of the National Metallurgical Laboratory of India for the past three and a half years, is resigning from the Indian Council of Scientific and Industrial Research at the end of April, and will visit England and Canada. Dr. Contractor was affiliated with the Council for almost nine years.

A. J. Cayia has been named vice president and general manager of Caland Ore Company, Ltd., Canadian subsidiary of Inland Steel Company which is leasing and developing the Steep Rock orebody in northwestern Ontario.

Richard H. Willey is new general superintendent of Philippine Iron Mines, Inc. in Luzon, P. I. The island mine was an open-pit operation operated by the Japanese during the occupation of the Philippines. Mr. Willey formerly was general hill foreman at the Bingham mine of the Utah Copper Division, Kennecott Copper Corporation.

Mrs. Viola R. MacMillan was elected president of the Prospectors and Developers Association for the tenth consecutive year in Toronto, Canada recently. Other association officers include **Cyril T. Young**, vice president; **J. J. Rankin**, secretary; and **Mrs. D. Drew**, assistant secretary.

Paul Clarke, former superintendent of Morning Star (G. M. A.) Mines N. L. in Wood's Point, Victoria, Australia, is now manager of Kingston (Open Cut) Gold Mines Ltd., Kingston, Queensland. The ore-body, which contains about 3 pennyweights of gold per ton, is 14 miles from Brisbane.

Dr. Ukar Bratakusuma has been appointed temporary manager of the Bangka tin mine by the Indonesian government. Dr. Bratakusuma, former public works minister in the Sukiman-Suwirjo cabinet, will be assisted by

MAX GOLDICK (man in the center holding hat) was in Australia early in the year visiting the properties of Mt. Isa Mines, Ltd., Mt. Morgan, Ltd., and Mt. Lyell Mining and Railway Co., Ltd., as well as the copper smelter of the Electrolytic Refining & Smelting Co. of Australia Pty. Ltd. at Port Kembla. He is concentrator superintendent of Roan Antelope Copper Mines Ltd. at Luanshya, Northern Rhodesia. Shown with him (left to right) above are D. F. SCOTT, metallurgist of Timbrol Ltd. at Rhodes, New South Wales; A. F. EVANS, manager of Electrolytic Refining & Smelting; and S. H. WELLINGTON, sales manager of Timbrol. Timbrol manufactures industrial chemicals and flotation reagents, many of which are shipped to South Africa and the Rhodesias.

Dr. Tampubolon, chief of the government mining service in Bendung. The Billiton company previously operated the property.

Sir Ernest Oppenheimer has resigned as permanent director of Anglo American Corporation of South Africa, Ltd., but will retain active direction of the company as chairman of the corporation and a regular director. In resigning, Sir Ernest cancels his co-founder's rights in order to improve the financial position of the corporation.

Pushpa B. Malla, mining engineer for the government of Nepal, India, is now in the Pacific Northwest studying U. S. mining methods. He will be joined shortly by two Thailand engineers, **C. P. Diskul** and **C. Nilkuha**, with whom he will spend the next three months visiting major operations in the area. Mr. Malla said Nepal hopes to revive its long-idle mining industry, and that deposits of iron, copper, lead, nickel, cobalt, and zinc are known.

A team of five Japanese iron mining experts are now in Portuguese Goa studying prospects for Japanese investments in iron mines there. The mission is headed by **Yutaka Kubota**, president of the Kokudo Haihatsu Company. If a satisfactory report is forthcoming, three Japanese steel firms—Fuji, Yawata and Japan Steel Tube—will open negotiations for a joint project.

Mervyn L. Wade, former geogolist with the Adelaide Department of Mines, is now chief geologist with Mount Lyell Mining and Railway Company, Ltd., Queenstown, Tasmania, Australia. The Mount Lyell company has large exploration projects underway.

J. B. Martin, previously employed by the Benguet Consolidated Mining Company in the Philippines, is now with Macondray and Company. Macondray is erecting the new mill of Paracale Gumaus Mining Company in North Carmarines.

Eiichi Nomura has left the Kawayama Mine in Yamaguchi-ken, Japan, to assume new duties as vice general manager of the Nippon Mining Company's Hitachi mine, smelter and refinery. His new address is Hitachi-Kogyosho, Motoyama, Hitachi-shi, Ibaragi-ken, Japan.

John L. Robison has resigned from his position as general manager of Cia, Huancaca de Bolivia, Pulacayo, Bolivia, and has returned to the United States. He is now employed by International Minerals and Chemical Corporation at its Noralyn phospate mine near Bartow, Florida.

E. C. Roper, general manager of Britannia Mining & Smelting Company, has been elected president of the Mining Association of British Columbia. He succeeds **M. M. O'Brien**, managing director of Bralorne Mines, who served two terms. Vice president of the metalliferous branch of the association is **H. E. Doelle**, managing director of Sheep Creek Gold Mines.

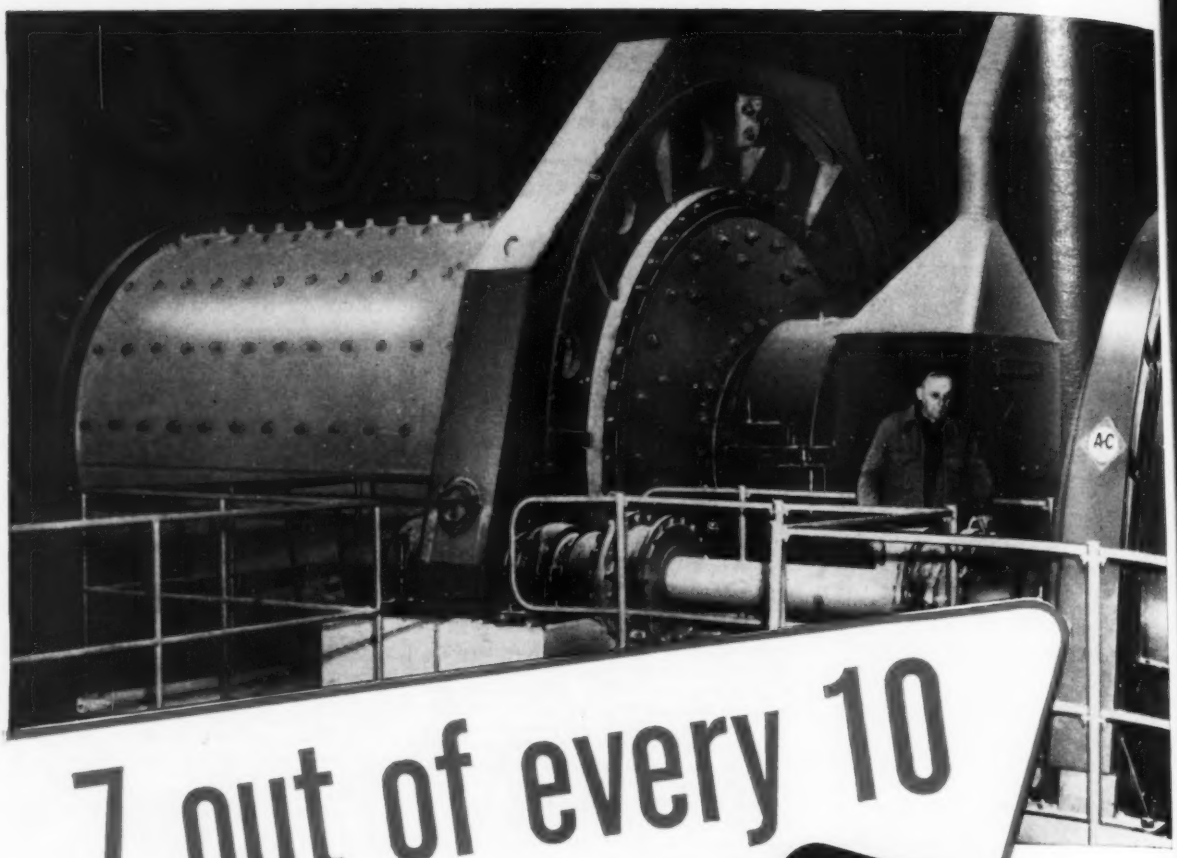
Consolidated Zinc Proprietary, Ltd. has organized a staff for its subsidiary, Territory Enterprises Proprietary, Ltd., which will work Australia's Rum Jungle Field. The staff consists of **S. Christie**, manager; **E. N. Brown**, civil engineer; **R. C. James**, mine superintendent; and **W. N. Thomas**, geologist. **F. Struan Anderson**, group mining engineer for Consolidated Zinc, is director of the Rum Jungle project.

Tom T. Heywood has left Rochdale, England to take a job as mining engineer with Sierra Leone Development Company, Ltd. at the Marampa, Freetown, Sierra Leone.

Victor Hampton has been appointed general manager of the former Patino mines in Catavi, Bolivia by the Bolivian Mining Corporation. Mr. Hampton has worked for large mining companies in both Bolivia and the United States for many years, and most recently was managing director of Mineracao Aahchang, S. A., Sao Paulo, Brazil.

Ingvar Janelid, an authority on drilling and blasting, is now professor in mining operation and surveying at the Royal Institute of Technology, School of Mines, Stockholm, Sweden.

H. Y. N. Sprod, **L. Mansfield**, and **B. I. Thomas** have resigned from the board of Wolfram Hill, N. L., Australia.



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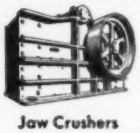
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INTERNATIONAL NEWS

U. S. FIRMS EXPLORE AND DEVELOP PERU'S IRON AND COPPER DEPOSITS

Mining activities have been steadily on the increase in Peru during the past year as three United States firms continue to explore and develop large iron and copper deposits.

The American Smelting and Refining Company has formed a new subsidiary, Southern Peru Mining Company, to bring its Toquepala property into production. Reserves are estimated at about 400,000,000 tons of 1.0 percent Cu. To prepare for open pitting at a rate of about 22,000 tons per day, approximately 92,000,000 tons of waste capping will have to be stripped. Thereafter, the average stripping ratio of waste to ore will be 1.55 to 1. Plans call for an initial production of 100,000 tons of blister copper annually for 10 years, 85,000 tons annually for the following period of 20 years, and an average of 68,000 tons annually for the remaining estimated 16-year life of the operation. About $160,000,000 will be required for mine preparation and equipment, concentrator, water supply, railroad to the port of Ilo, smelter, power plant, port works, townsites, and working capital.

The major facilities of Toquepala are also expected to serve the nearby Quellaveco mine. No work has been carried out since exploratory drilling proved a porphyry-type copper deposit at Quellaveco containing about 200,000,000 tons of ore averaging slightly less than 1.0 percent Cu. This orebody can be mined by open-pit methods with an average stripping ratio of waste to ore of 0.9 to 1. The mine is not expected to be placed on a producing basis for a number of years. ASARCO's investment in these two properties is approximately $7,000,000. An application for a loan has been made to the Export-Import Bank.

Cerro de Pasco Corporation started intensive exploration by drilling of its Cuajone porphyry deposit near Toquepala, and has many other properties under investigation; a subsidiary exploration office is functioning in Arequipa. Mining operations are steadily growing, with the San Cristobal mine currently being prepared for production. Milling capacity is being increased. The Paragsha mill now has a 1,000-ton-per-day capacity, and a new 35-ton electrolytic zinc refinery has been completed. Work has started on two 35-ton-per-day Sterling zinc units, and on the construction of Paucartambo hydroelectric plant, while the Malpaso plant is being enlarged.

Intensive drilling by Utah Construction Company at the Marcona mining deposits in the Department of Ica brought about the formation of a joint operating company by Utah and Cyprus Mines Corporation—the Marcona Mining Company. The new firm has obtained a 20-year lease on the deposits from the owners, the Peruvian government-controlled Santa Corporation, while the latter has an option for use of up to 300,000 tons per year at below market price for the iron and steel plant it is planning at Chimbote.

Place-fix map of copper and iron mine developments in Peru.

The Marcona deposits are located within trucking distance of the coast; however, the firm will have to spend about $10,000,000 to construct a port at San Nicholas Bay. Plans are to export from 5,000 to 10,000 tons monthly late in 1953, with ultimate exports limited in proportion to the reserves proved. These are said to be 100,000,000 tons of 60 percent Fe, but much of this is believed to carry about 3.0 percent S. Some 20,000,000 tons are of higher grade and low in sulphur.

Falconbridge Nickel Signs Big Contract With U. S.

Between 100,000,000 and 200,000,000 pounds of nickel have been purchased for the United States stockpile from Falconbridge Nickel Mines, Ltd. of Toronto, Canada.

Under terms of the contract negotiated by the Defense Materials Procurement Agency, Falconbridge will deliver at least 100,000,000 pounds of nickel by June 1962, and will ship at least 2,000,000 pounds this year. If Falconbridge can deliver, an additional 50,000,000 pounds will be purchased during the same period. The United States government has an option to buy an additional 50,000,000 pounds between mid-1962 and June 20, 1967.

Falconbridge discovered important nickel reserves during the latter part of 1951, and will speed up expansion plans to increase production. The stepped-up program will involve a $42,000,000 underground program, part of which will be financed by an amortization allowance paid by the U. S. government in addition to market price until mid-1962. After that, the government will pay only market price. Two shafts—one 3,700 feet deep and one 3,500 feet deep—will have to be sunk, milling facilities installed, and additional smelting and refining capacity provided.

In addition to the nickel contract, the government will also obtain up to 2,000,000 pounds of cobalt from Falconbridge by June 30, 1962 and up to 52,000,000 pounds of refined copper by December 31, 1958. Price for the cobalt will be the market price or $1.80 per pound, whichever is greater. The copper will cost 30, 27½ or 19 cents per pound, depending on the period of delivery and on whether the copper is part of the company's committment or is offered at its option.

Small Mexican Mines Sell Manganese Ore To DMPA

Four contracts calling for delivery of 230,500 tons of manganese ore have been signed by the Defense Materials Procurement Agency. The contracts are part of a general program to develop manganese deposits on this continent, and eventually some 550,000 tons of Mexican ore will be purchased.

Firms involved in the transaction are Winter, Wolff & Company, New York; Frank Samuel & Company, Philadelphia; Continental Ore Company, New York; and Industrial Development Corporation de Mexico, S. A., of San Luis Potosi, Mexico. An earlier contract for 50,000 tons was signed with Manganese Producers, El Paso. Contracts for the remaining 269,500 tons are under negotiation.

Initially, ore will be produced at 30 to 40 small mines in Mexico, and delivered to a depot at El Paso, Texas, where it will be purchased at $19.30 per long ton for 25 percent ore. Bonuses will be paid for ore above 25 percent, and penalties will be imposed for any below, down to and including 20 percent. Ore with a content lower than 20 percent will not be accepted. Howard I. Young, deputy administrator of the DMPA, said a contract will be negotiated with a private concern for construction and operation of the processing plant.

When the project is fully underway, ore from 60 to 100 mines as far as 1,000 miles from the border will be involved.

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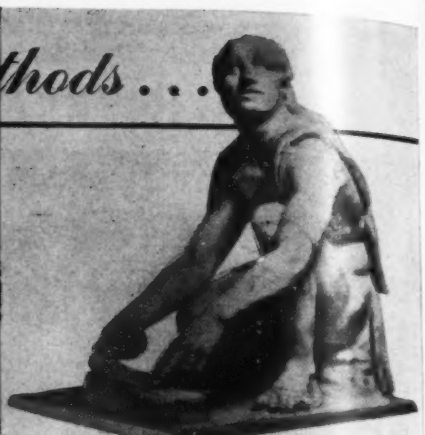

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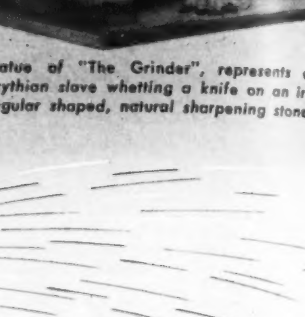

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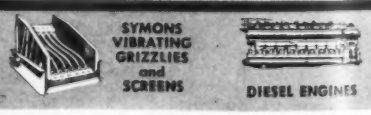

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New Company Formed To Mine African Manganese

Compagnie Miniere de L'Ogoue has been formed by French and United States capital to mine manganese deposits in an area 60 kilometers square near Franceville, French Equatorial Africa.

Prospecting and exploration have not yet been completed but it is estimated that about 300,000 tons annual output is possible from the deposit. Mining would be by open-pit methods. Most serious obstacle to the project is the problem of transportation to the Coast. A capital outlay greater than that needed for the mine itself would be required to solve this transportation difficulty.

Companies interested in the project include the United States Steel Company Compagnie Miniere de L'Oubangui Oriental, Group Mokta Hadid, and Bureau Miniere de la France d'Outre-Mer.

Philippine Gold Mines Struggle for Existence

Six of the ten gold producers in the Philippines operated last year at a net over-all loss of Pesos 891,162.09 and the Philippine Gold Producers Association has started "Operations Survival."

Henry A. Brimo, president, heads the movement asking Congress for a tax relief program. He states that, even though operating at a loss, the mines had to contribute Pesos 9,500,000 to the government in direct and indirect taxes.

Total gold production in 1952 was valued at Pesos 45,449,547.97, yet only one mine could afford to pay a dividend out of its gold production. Suriago Consolidated Mining Company in Mindanao produced Pesos 6,001,951.39 worth of gold and made a net profit of Pesos 825,152.62. Benguet Consolidated Mining Company was also able to pay a dividend; but it was out of its profits from the operation of Consolidated Mines' chromite deposit at Masinloc, Zambales.

Closure of the mines would make a big dent in the economy of the Philippines. $21,954,240 was paid out last year to 16,335 laborers, and it is estimated that 98,010 people are dependent upon them. The capital invested is Pesos 37,000,000 in capital shares outstanding, while five of the mines are heavily in debt.

The gold producers are asking for the alleviation of the following taxes: the 17 percent Exchange Tax, the 7 percent Compensating Tax on direct importations of mining supplies and equipment which are not for resale, and the elimination of the graduated scale royalty and ad valorem tax.

QUEENSLAND–First blister copper from *Mount Isa Mines Ltd.'s* new smelter was poured during the second week of February, but full capacity has not yet been achieved. In February, 50,430 tons of lead ore were milled to produce 2,900 tons of bullion and 2,986 tons of zinc concentrate. 24,941 tons of copper ore were mined, milled, and smelted to produce 407 tons of blister, indicating an ore grade of 1.63 percent copper based on metal production. The first 2,500 to 3,000 tons of production were shipped to the United States for fire refining. Although Australian copper production is below consumption, there will be a surplus until import contracts with Northern Rhodesian suppliers expire.

NEW GUINEA–*New Guinea Goldfields Ltd.* almost completed construction of its new cyanide plant during 1952. *Bulolo Gold Dredging Ltd.* showed an increased profit last year of $1,710,716, and reported reserves of 80,500,000 cubic yards of gold-bearing gravel.

VICTORIA–*Victorian Antimony Mines Ltd.* at Costerfield again had to postpone the anticipated date for initial production. Continuous production is expected shortly, however, with commercial production starting in July.

TASMANIA–*Montana Silver Lead N.L.* at Zeehan has started operation of its flotation plant. Ore is said to assay 10 percent lead, 1.7 percent zinc, and 10 to 12 ounces of silver per ton. Zeehan was formerly a very important center for silver-lead production, with greatest output in the first 10 years of this century.

PHILIPPINE ISLANDS–A 200-ton mill with an original smaller capacity is being erected by *Macondray and Company* on the property of the *Paracale Gumaus Consolidated Mining Company* in the Paracle mining district in north Camarines. Rehabilitation operations started on this property in 1951 when its war claims were paid by the Philippine War Damage Commission. The initial program called for pumping out of the mine down to its main operating levels which are as low as 675 feet below surface. To facilitate this and to reduce the load on the pumps, the drain tunnel, or Level 150, had to be reopened. Considerable difficulty was experienced in this operation due to excessive caving. The drain tunnel was completely cleared, however, and pumping operations were started in September 1952.

NORTHERN TERRITORY–H. J. (Terence) Conolly, one of Australia's foremost consulting geologists, has staked 23 mineral claims in and around Tennant Creek. The mineral sought is not disclosed, although gold and copper appear most likely in the area.

NEW ZEALAND–Latest returns from *Arahura Gold Dredging Ltd.* at Arahura, show 539 ounces of gold recovered from 69,000 cubic yards of gravel. *Kanieri Gold Dredging Ltd.* at Kanieri, recovered 618 ounces of gold from 91,000 cubic yards of gravel.

PHILIPPINE ISLANDS–Installation of the 100-ton flotation plant is the next step in the rehabilitation program of *Santa Barbara Mining Company.* Nearly all of the machinery is now at the mill site and it is estimated that milling operations will begin in about six months. The present water level is at the 300-foot point and no difficulty is expected in un-

Consolidated Profit and Loss Statement* for Major Philippine Island Gold Producing Companies for the year ended December 31, 1952

Company	Value Bullion Produced	Less: Cost of Production	Net Operating Profit or Loss	Plus: Other Income	Net Profit or Loss Before Income Tax	Less Provision for Income Tax	Net Profit (Loss)
Atok-Big Wedge Mining Co., Inc.	3,928,417.34	4,135,685.11	207,267.77	23,091.76	184,176.01	———	184,176.01
Baguio Gold Mining Company	2,059,976.32	2,167,266.48	107,290.16	12,405.51	94,884.65	———	94,884.65
Balatoc Mining Company	9,675,551.85	9,479,209.16	196,342.69	———	196,342.69	46,796.00	149,366.69
Benguet Consolidated Mining Company	9,944,201.17	9,029,882.99	914,318.18	———	914,318.18	248,009.00	666,309.18
Coco-Grove, Inc.	457,022.50	1,006,547.78	549,525.28	40,158.62	509,366.66	———	509,366.66
Itogon Mining Company	4,383,844.30	4,478,398.93	94,554.63	121,930.75	27,376.12	7,322.82	20,053.30
Mindanao Mother Lode Mines, Inc.	4,110,961.33	4,775,047.17	664,085.84	164,633.22	499,452.62	———	499,452.62
San Mauricio Mining Company	3,175,080.26	3,690,307.66	515,227.40	56,094.91	459,132.49	———	459,132.49
Suriago Consolidated Mining Company	6,001,951.39	4,869,140.11	1,132,811.28	2,122.92	1,134,934.20	309,781.58	825,152.62
United Paracale Mining Company	1,712,541.51	2,569,923.18	857,381.67	52,350.22	805,031.45	———	805,031.45

* In Philippine Pesos.
=== Indicates Loss.

watering workings. The developed ore reserve is estimated at 35,000 tons valued at Pesos 1,540,000. Santa Barbara is operated by *Demonstration Gold Mines Ltd.* under its pre-war operating contract.

CANBERRA, AUSTRALIAN CAPITAL TERRITORY—Further uranium ore finds are reported from the Northern Territory, not far from the previous discoveries at Edith River. Publicity has been given to the fact that prospectors were discouraged by government control, so the government has requested the Atomic Energy Commission to formulate a policy designed to encourage private interests. The government has also continued operations of the mica pool for another year. At a quarterly sale in December at Alice Springs, Northern Territory, the Commonwealth buyer purchased £A35,000 worth of the mineral. Canberra controls the Northern Territory, hence the Commonwealth government comes into the picture largely in the case of those mineral products, such as mica and uranium, which are largely exclusive to the Territory. The South Australian government controls Radium Hill because the deposit is in that state.

PHILIPPINE ISLANDS—*General Base Metals, Inc.* has recently announced the shipment of 4,100 tons of manganese ore from Bohol to Japan, representing the 19th manganese shipment of the company since it was organized. The ore loaded was of 40 percent grade. The company expects to make two shipments within the next two months.

WESTERN AUSTRALIA—The closure of the *Big Bell Mines Ltd.* at Cue has been avoided by the provision of £A100,000 by the state government of Western Australia. The loan will be spread over two years and will enable the company to develop the 1,250-foot level. The mine produces 400,000 tons of low-grade ore per year, yielding 50,000 ounces of gold. The loan is to be repaid only if the price of gold rises. Any increase will be shared equally by the company and the state government. The *American Smelting and Refining Company* owns a large interest in Big Bell.

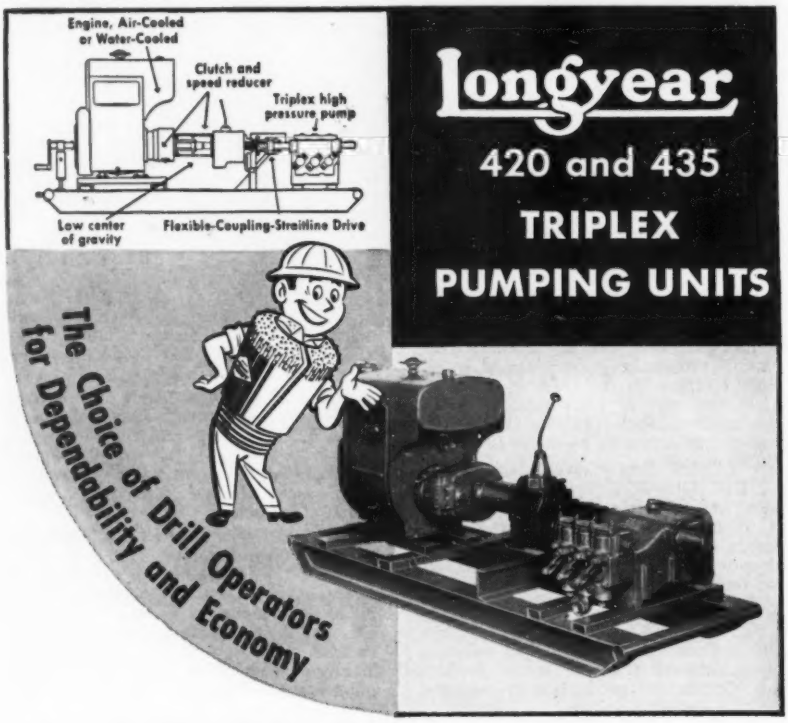
FIJI ISLANDS—The *Emperor Gold Mining Company* and *Loloma (Fiji) Gold Mines N.L.* have acquired leases on 14,000 acres in the hope of developing additional gold deposits. The move was made in anticipation of the depletion of present deposits, and also by the attraction of reduced taxes and royalty payments by the Fijian government.

PHILIPPINE ISLANDS—*Mindanao Mother Lode Mines* reports that operations at the mine property at Surigao Mindanao were "disappointing" from the standpoint of ore discovery despite the able assistance of two geologists and a record-breaking 19,184 feet of development during 1952. T. M. Jordan, president, stated, "We were unable to develop a sufficient amount of ore of profitable value to replace the ore mined and milled during the year." Three prospecting crews are at work in an attempt to discover and develop additional ore bodies. In 1952, the company produced Pesos 4,184,394 worth of gold and reported that it lost Pesos 499,453.62.

WESTERN AUSTRALIA—*Hill 50 Hold Mines N.L.* at Mount Magnet has disclosed high values in diamond drilling below the 820-foot level. Up to 16 ounces of gold per ton was recorded with an average of 4¾ ounces per ton over 87 feet. The ore has a true width of 43 feet. Previous ore was about 0.27 ounce per ton. Annual tonnage being mined is about 32,000.

PHILLIPPINE ISLANDS—Operations at the *Itogon Mining Company* in Baguio district of Mountain Province have been proceeding normally. Unwatering of the Sesame 23 Interior Shaft continues and has reached the 1,100 level station. The bottom of the shaft has been cleared. Meantime, development work on the new 1,000-foot level is being rushed to open the four veins known to exist in this area, namely, the Sesame, Gilkinson, 23, and 31 veins.

JAPAN—The *Muromachi Bussan Kaisha, Ltd.* will merge with *Mitsui Bussan Kaisha, Ltd.* if stockholders approve the action. Muromachi imports and exports ferrous and nonferrous metals, ores,



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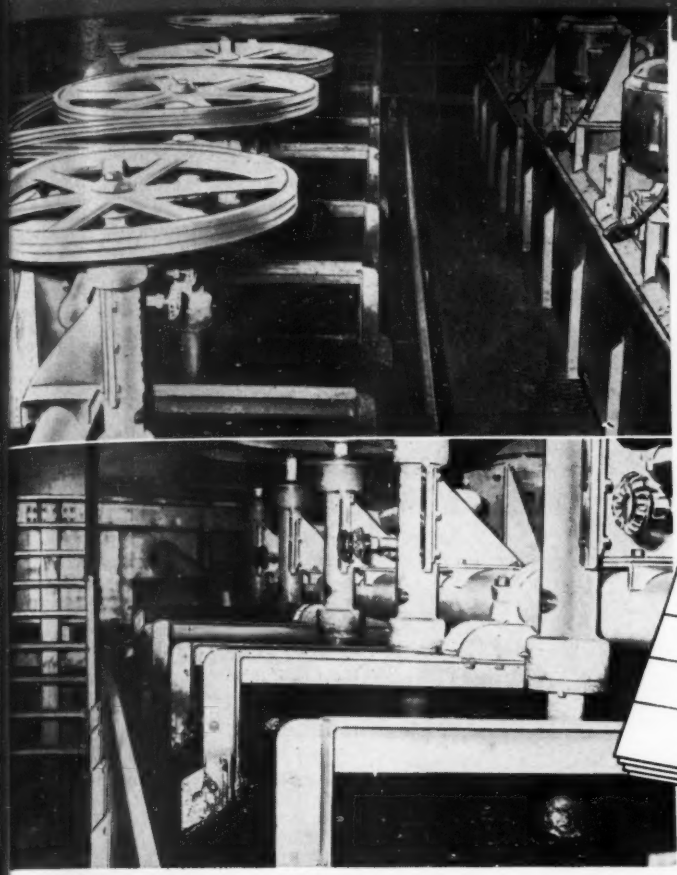

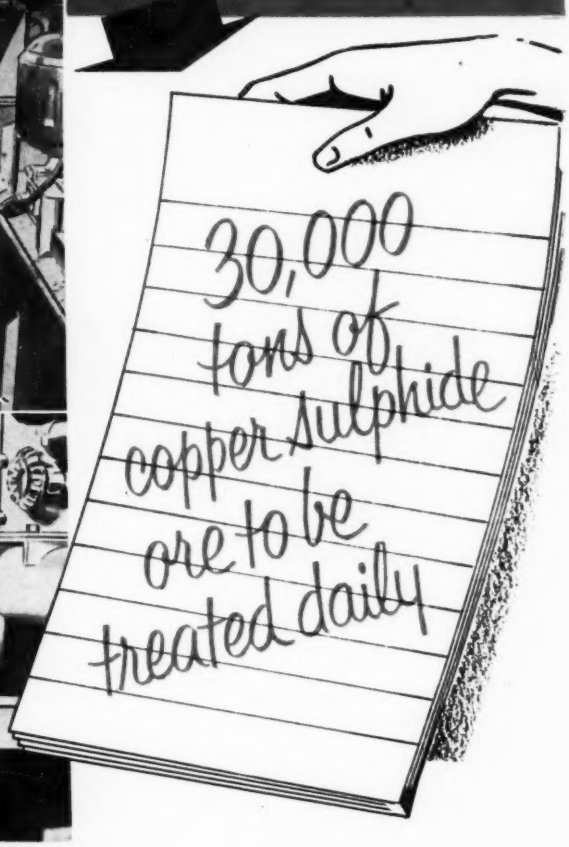

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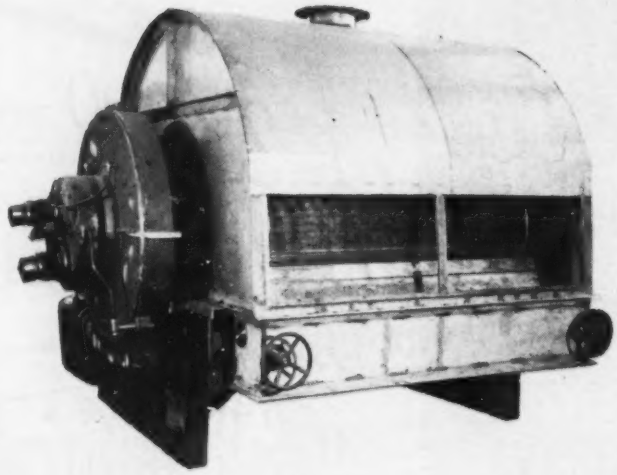

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etc. The organization would assume the name of Mitsui Bussan Kaisha, Ltd. starting July 1, 1953 and present capitalization of 150,000,000 yen would be increased to 300,000,000 yen.

BURMA—*Non Ferrous Metal Products Ltd.* reports that it expects to show a considerable increase in its distributable revenue with the end of this year, and it is reasonable to expect that this will be more than doubled. The company in its present form emerged from the reorganization of the *Burma Corporation, Ltd.* in February 1952. During the first part of the year, the firm's resources were held in liquidity with a view to conserving capital position.

THAILAND—*Kamunting Tin Dredging Ltd.* began to dismantle its No. 2 dredge in Pangnga in January. Yong Eu Kong is planning to open up three more gravel pump mines in Bhuket on leases owned by the *Southern Kinta Consolidated Ltd. Takuapa Valley Tin Dredging N.L.* reports that its *Takuapa* dredge which sank during heavy rains last October, has now been refloated. The *Ronpibon* dredge of *Tongkah Harbour Tin Dredging Ltd.* is undergoing an alteration. Steam engines will be replaced with Diesel-electric equipment.

PAKISTAN—Production of chromite during 1952 was 17,419 tons, compared with 17,498 tons in 1951. Main producers were *Pakistan Chrome Mines Ltd.* with 13,349 tons, and *Pakistan Industries Ltd.* with 3,350 tons. *F. B. Patel* produced 405 tons, and *K.B.H.M. Habibullah Company* produced 315 tons. During the year, 32 mining leases were renewed for Pakistan Chrome Mines, Ltd., 11 leases were granted to Pakistan Industries, and one went to *Pakistan Minerals Ltd.* K.B.H.M. Habibullah was granted five prospecting licenses and three mining leases.

JAPAN—The first titanium to be exported from Japan went to the United States when the *Daiichi Bussan Trading Company* shipped one ton. The metal was produced by the *Osaka Titanium Manufacturing Company* whose monthly output is 4.5 tons.

INDIA—Recognition of a new mineral species is rare these days. Apparently a new mineral has been found and named "cheralite" from Chera, the ancient name for the state of Travancore in South India where it was discovered. Cheralite is said to contain 31 percent thorium oxide and 4 percent uranium oxide. Unfortunately, the deposit is said to be too small for any commercial development at present.

LEBANON—Considerable attention is being focused on an iron ore deposit in the Lebanese Mountains. Ore samples reportedly show an iron content of 57 percent. A sample shipment of 2,500 tons has been sent to European steel plants, and results will determine the future of the project. Owner of the property is the *Margaba Mining Company.*

INDIA—The *Rajasthan Industrial and Mining Association* is urging the State Minister for Commerce and Industry to appoint an inquiry committee to find ways of assuring suitable markets for Rajasthan mica. It has also requested the State government to approach the Central government about fixing export quotas in proportion to production. The association states that the industry is passing through a critical phase because of diminishing demand coupled with the fall in prices. Rajasthan produces 30,000 cwt. of cut mica annually out of India's total production of 120,000 cwt.

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JAPAN—The Ministry of International Trade and Industry hopes to import 200,000 tons of iron ore from India in 1952. Japan has tentatively fixed its 1953-1954 fiscal year goal for steel goods at 4,700,000 tons; for pig iron at 4,000,000 tons; and for aluminum ingots at 45,200 tons. To accomplish this, a total of 3,900,000 tons of iron ore, 3,000,000 tons of coking coal, and 50,000 tons of scrap iron must be imported. Besides the amount from India, Japan plans to import 950,000 tons of iron ore from the United States and Canada, and 2,960,000 tons from South-East Asia, including 700,000 tons from Malaya, 1,400,000 tons from the Philippines, and 120,000 tons from Portuguese Goa.

THAILAND—The *Thai Mining Association* opened its headquarters in Bhuket on February 28.

PAKISTAN—Nonmetallic mineral production during 1952 was as follows: ochres 408 tons; celestite 431 tons, 136 tons in 1951; gypsum 29,194 tons, 22,784 tons in 1951; silica sand 4,615 tons, compared with 5,325 tons in 1951; fireclay 6,302 tons, compared with 4,108 tons in the previous year; limestone 702,478, compared with 343,956 in 1951. In the case of the ochres, this was the first production for the country. Two leases were granted for this mineral for the first time in 1952. One of the leases is in Punjab and the other in Sind.

TURKEY—A new chrome area has been located in the vicinity of Tokat near the Black Sea and about 10,000 tons of ore have been sold from these mines. The owners say that their mining capacity has reached 30,000 tons of ore per year. Until this discovery, chrome ore has generally been found in southern and western Turkey.

PAKISTAN—The first photographs taken in the present air survey of Pakistan are being examined in Toronto by officials of the *Photographic Survey Corporation Ltd.* of Canada. These have been produced in the largest air survey ever made of the country's resources. Total area covered will be 165,000 square miles, at a cost of $2,000,000. The funds are drawn from a $10,000,000 fund set up by Canada under the Colombo Plan. Scheduled for completion in 1956, the survey will furnish detailed information on Pakistan's natural resources paving the way in planning of future industrial development.

INDIA—Travancore-Cochin exported 240,321 tons of ilmenite and 80 tons of rutile, both mineral sands found along the Travancore coast, in 1950 and 1951. The production came from two companies working as agents of the government under mining agency agreements, and from one state-owned company. Another state-owned firm did not work during the period. Total production during 1950-51 was 200,461 tons of ilmenite and 43 tons of rutile (the difference in export probably coming from stockpiled minerals). The state geological department investigated mineral sands during 1950 and 1951 and reported large limestone bed in the southern part of the state. Average thickness is eight feet and width 800 feet, traced to a length of about one mile. Estimated tonnage is about 200,000 tons.

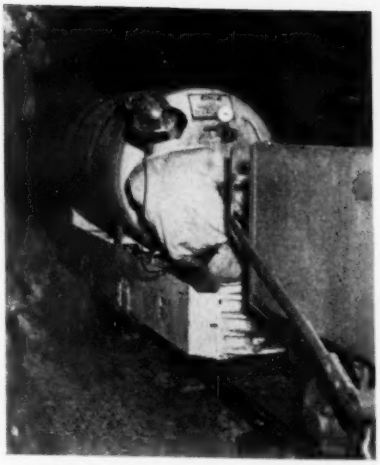
EUROPE

AUSTRIA—1952 output of Austria's nationalized mining industry exceeded any earlier year's production considerably. This was the first full year's use of the new mining machinery delivered to Austria under the Marshall Plan and the provisions of the Mutual Security Administration. Iron ore mines yielded 2,652,588 metric tons during the year, against 2,369,672 metric tons during 1951. Compared with 1937, the last pre-war year, when production totaled 1,884,694 tons, 1952 output showed an increase of 40.5 percent. Production of lead-zinc ore amounted to 150,310 metric tons, including 31,251 tons gained from waste; this compares with 110,646 metric tons during 1951. The increase thus amounted to 33.8 percent. Copper mining produced 140,165 metric tons. The corresponding figure for 1951 was 84,884 metric tons. 742,259 metric tons of magnesite were mined in 1952, against 664,839 metric tons in 1951. Comparison with 1937 with a volume of 397,383 metric tons shows an increase of 86.6 percent.

ITALY—Quicksilver production in 1952 totaled 1,926 tons, an increase of 3.8 percent. Previous output was 1,856 in 1951, 1,839 in 1950, 1,535 in 1949, and 1,318 in 1948.

FRANCE—It is reported that France will buy 50,000 tons less of nitrate this year than in previous years. The drop is attributed to the increase in the price of nitrate, and the decrease in the price of synthetic nitrate. Normally, about 125,000 tons are imported by the country annually.

PORTUGAL—An iron and steel industry will be established within the country to use the large reserves of iron ore. Under a six-year economic development plan, about 250,000,000 escudos will be invested in the industry. The money will be distributed as follows: 1953—45,000,-



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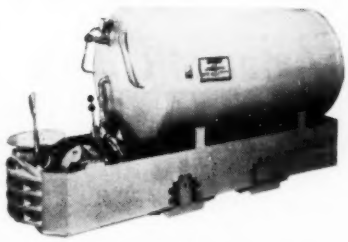

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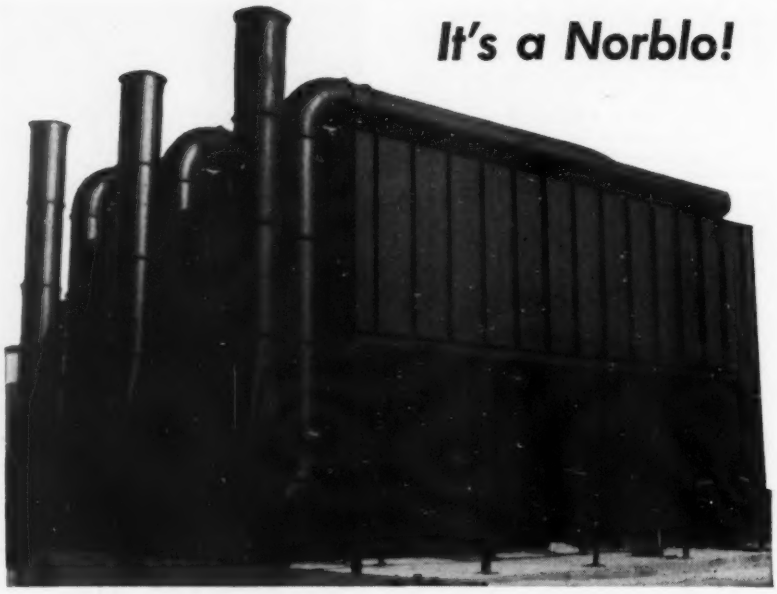

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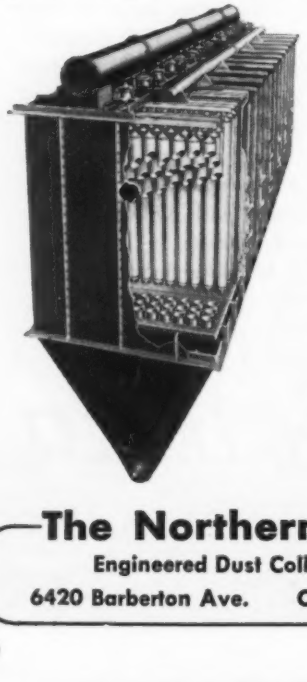

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000, of which 20,000,000 will be public funds and the rest from private sources; 1954—38,000,000; 1955—[illegible]000,000; 1956—90,000,000. Average annual imports of pig iron and rolled products have been about 200,000 tons, contributing heavily to the country's foreign trade deficit.

POLAND—The nationalized mining industry, scattered over three large areas, produced 725,000 metric tons of iron ore during 1952, as compared with the prewar (1938) level of 850,000 metric tons. Production dropped to an all-time low of 420,000 in 1946, and reached 680,000 tons in 1949. During 1955, the last year of the current Six-Year Plan, Poland hopes to mine 3,000,000 metric tons of iron ore. This ore has an iron content of only 40 percent, however, and imports of high quality ore for certain needs are usually obtained from Sweden in exchange for Polish coal.

CZECHOSLOVAKIA—Czechoslovakia will receive an undisclosed amount of copper and chromium ore from Albania during the coming year, under terms of a 1953 Trade Agreement signed by the two countries in February. It was announced at the same time that Soviet-sponsored Albanian mines will bring about a reduction in direct Soviet imports of copper and chromium ore.

AUSTRIA—The ore processing capacity of the *United Austrian Iron and Steel Works* of Linz, Upper Austria province, has been enlarged by the installation of a conveyor system able to load three high bunkers from the one base bunker now in use. From the three high bunkers, the ore is loaded onto trucks with self-unloading mechanism, and brought to the furnaces. In the loading department, an automatic ore-checking device has been installed which takes ¼ ton of ore out of the conveyor system every five minutes. For the ore processing system, a new rotary table with a capacity of 550 tons per day has been put into operation.

PORTUGAL—The export tax on wolframite ores will be maintained despite the decline in the world market price in recent months. The Portuguese Minister of Economy reports that current prices are still sufficiently high to justify the tax, although he predicts that a number of smaller mining firms will probably have to close down because of the high cost of production. Total shipments of wolframite totaled 4,495 tons in 1952, compared with 4,223 tons in 1951. The United States received 2,112 tons, compared with 1,697 tons in 1951; Great Britain received 1,654 tons, compared with 2,288; France 369 tons, against 60; and Germany 196 tons, compared with 76 in 1951.

POLAND—Polish industrial production rose 20 percent during 1952. Coal output, the country's greatest natural wealth, reached 84,500,000 long tons, an increase of 25,500,000 tons or 41 percent, over the 59,000,000 tons mined five years earlier at the start of the Three-Year Plan (1947-1949). Among the products showing increases over the previous year's production were pig iron 13 percent; steel 14 percent; iron ore 14 percent; copper ore 55 percent; zinc ore 18 percent; and refined lead 13 percent.

ENGLAND—Directors of *New Consols* mine have decided to abandon the property and it is understood that a large number of men have been discharged while the pumps are being withdrawn. Reactivated in 1948, the old workings of the mine had been unwatered and developed as a tin mine. (Formerly the mine

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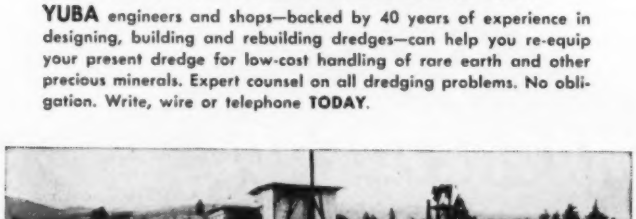

YUBA #107, 3 cu. ft. buckets owned by H. & H. Mines, Inc. Over 15 years old, with portable pontoon hull, it was moved from its original property and re-equipped by owners for dredging scheelite at Henderson Creek, Montana.

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*United States Steel product.

had been a copper and arsenic producer. Although a great deal of development and crosscutting was carried out, results were disappointing. The company is still interested in recovering wolframite from nearby surface deposits, however, and has an interest in the *Tasbartha* wolframite mine operated by the *Wolfram Prospecting Syndicate*.

CHILE—A loss of nearly $2,500,000 is reported from the *Chuquicamata* copper plant of *Chile Exploration Company*, a subsidiary of *Anaconda Copper Mining Company*. Most of the loss has been caused by damage from floods following a cloudburst; however, an illegal walkout by 1,100 workers forced a short but complete stoppage of work, even though 5,400 remaining workers were not on strike.

BRAZIL—*Cia. Vale do Rio Doce* exported 1,507,013 tons of iron ore in 1952, thereby exceeding the company's goal of 1,500,000 tons a year. Construction of a double-tracked railroad line between Nolasco Station on the Vitoria-Minas line, and of ore loading quays, has solved the problem of loading the ore making it possible to load a 10,000 vessel every day. Even greater expansion is now planned.

MEXICO—*American Metal Company, Ltd.* reports its production in 1952 as follows: 400,670 short tons copper, compared with 410,008 in 1951; 207,122 short tons lead, compared with 183,734 in 1951; 111,029 zinc, compared with 129,742 in 1951; 44,051,344 ounces silver, compared with 45,617,663 in 1951; 7,850 long tons tin. No significant tin sales were reported in 1951 because of government controls. Net income in 1952 was $9,990,381, compared with $10,782,359 in 1951. Tonnage production for the year continued at approximately the same level as in 1951, but profit margins suffered during the second half of 1952 with the decline in lead and zinc prices. The Avalos unit in Zacatecas was most adversely affected by the price decrease. It cannot operate profitably at the low prices. The Topia unit in Durango, Mexico, began production during the year; and the Guadalupe unit in Nuevo Leon was also brought into production. The Calabaza unit in Jalisco was successful in developing additional ore and the outlook for the unit improved considerably. The Ocampo unit in Coahuila also operated satisfactorily throughout the year.

NICARAGUA—*Compania Minera La India* reports a net profit of $819,000 earned in 1952, compared with $1,115,000 in 1951. This includes dividends of $665,000, from the firm's subsidiary, *Empresa Minera de Nicaragua*. A net profit of $504,000 was earned by Empresa during 1952, compared with $941,000 in 1951.

ARGENTINA—The government of San Luis Province has decided to reopen several abandoned mines in the Pringles district. The same government has also equipped a modern laboratory for mining investigations.

SURINAM—The Department of Public Works and Traffic modernized its quarry

for crushed stone at Phedra in 1952. Output obtained was 10,000 metric tons, the same as in 1951, and still insufficient to satisfy local demand. About 500 tons of crushed limestone was imported from Trinidad. Near Zanderij, about 35,000 metric tons of quartz sand was dug by the Department, and small company dredged gravel in the Surinam River near Boschland. Exports of small lots of 200 tons of river sand were started to Curacao. Most of the sand and gravel was used for construction purposes. Small lots of shellsand, dug in pits on coastal sandy ridges, were used by the Department for burning to quicklime, and there were some rumors about starting private production of lime by burning shellsand.

CHILE—A German firm has contracted to buy about 400,000 tons of iron ore mined in the rich deposits in the province of Coquimbo.

JAMAICA—When asked why he permitted the outright sale of the bauxite deposits in Jamaica, the Secretary of State for the Colonies replied in the British House of Commons that the deposits had not been sold outright—they have only been leased to the operating companies for 25 years. Questioned about the fact that only 1/-d per ton royalty is being paid in this Territory, whereas in other Caribbean territories higher royalties are paid, he replied that the royalty rate was fixed in 1947. Under the Mining Regulations there is provision for a revision in the royalty rate every five years and this is now being considered.

VENEZUELA—Exploration drilling and tunneling are continuing at the *Cerro Bolivar* property of the *Orinoco Mining Company*, a *U.S. Steel Corporation* subsidiary. Preliminary grading for the mine railroad was started in October 1952; installation of mining facilities to mine 500,000,000 tons of ore was started early this year. Mining and shipments are scheduled to begin in 1954. Power shovels will load the ore into trucks for transfer to railroad ore cars; plans call for loading directly into ore cars at a later date. Initial mining and shipping rates have not yet been disclosed but it is understood that Orinoco intends to work up to a 10,000,000-ton yearly rate when feasible.

PERU—A recent survey indicated that Peru had proved iron ore reserves totaling 40,000,000 tons. In addition to these proven reserves, it is also reported that there are other iron ore deposits amounting to 130,000,000 tons. As part of her program to stimulate mining, Peru recently canceled import duties on equipment used in mining.

ARGENTINA—Intensive exploration for wolframite is going on in the province of Mendoza. Plans call for multiplying output 10 times by providing adequate mining equipment for the area, according to the new mining plan of the national government.

SURINAM—Bauxite has been discovered by F. C. d'Audretsch, field geologist of the Geological and Mining Service, on the 1,500-foot-high Wintiwai Mountain between the Surinam and Marowijne Rivers, 120 kilometers south of the coast. The Geological and Mining Service has started to test bore the clay deposit of La Vigilantia about 25 kilometers south of Paramaribo to evaluate its possibilities for a ceramic industry.

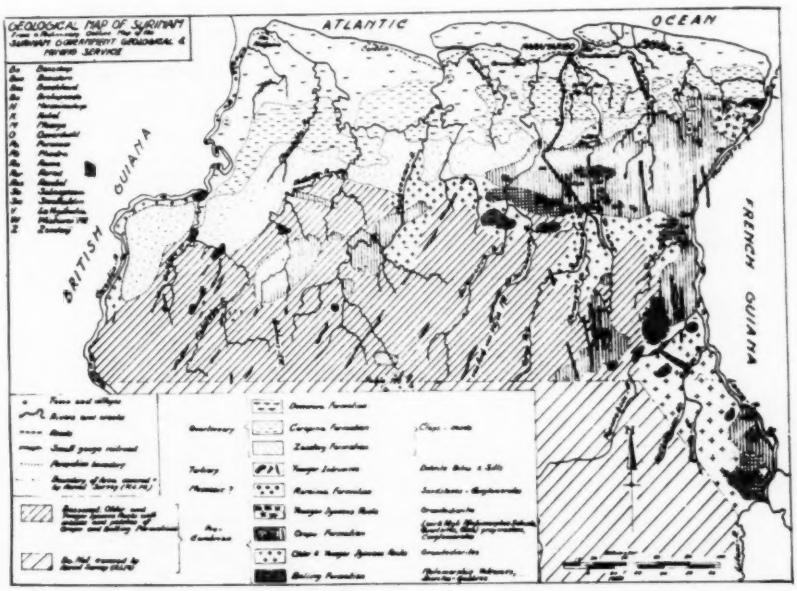
MEXICO—Adequate credits for small scale miners in Aguascalientes so they can operate more extensively have been asked of the federal government by Senator Pedro de Alba. He believes that small-scale miners are the real hope of continuance and advancement of mining in Aguascalientes, and reports that numerous deposits of gold and silver could be easily worked by an organized and well-financed effort. The financial phase of this proposition is being considered by the Ministry of Finance, while the Ministry of National Economy is arranging its technical aspects.

SURINAM—C. Smith, mining geologist of the *Berylium Corporation* of Pennsylvania, has expressed his satisfaction with the preliminary investigation of the beryl-pegmatite near Herminadorp on the Marowijne River. Samples are being tested in the United States.

NIGERIA—*Gold Coast Selection Trust*, after check sampling certain columbite deposits in the Liruie-n-Kano area of northern Nigeria, has acquired these areas with options to consolidate them. *Gold and Base Metal Mines of Nigeria* will be the operating company. Gold Coast Selection has also acquired tin and columbite deposits in the same area, formerly held by *United Tin Areas*. Production to date has been mainly by hand labor; however, since all are alluvial deposits, they will now be operated by monitors, gravel pumps, and sluicing. An extensive water conservation plan including construction of dams and leats, is being devised so that work will be possible beyond the normal rainy season. The firm expects to recover columbite and cassiterite. During 1952, Gold and Base Metal produced 26 tons of columbite and 570 tons of tin ore. It is estimated that 80 tons and 670 tons, respectively, will be recovered in 1953; and 150 tons and 750 tons, respectively, in 1955-1956. A contract has been negotiated with the United States to supply columbite during 1953.

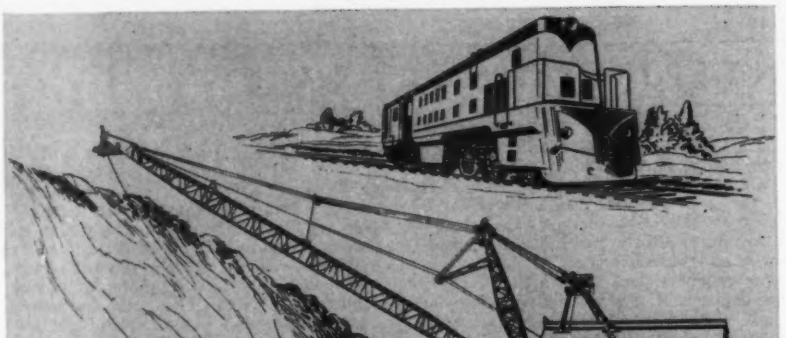
SOUTH WEST AFRICA—*Uis Tin Mining Company (South West Africa) Ltd.* will acquire 57 base claims from *Namib Tin Mines, Ltd.*, a wholly owned subsidiary of *Associated Tin Mines (South West Africa) Ltd.*, for £50,000. This claim area surrounds and winds through the *Oestlund* claims which belong to Uis. The Uis property contains tantalite-columbite pegmatites, while the claims owned by Namib contain extensions of these, as well as lithium- and tin-bearing pegmatites.

UGANDA—*Frobisher, Ltd.* is reportedly considering revision of its plans



NEWEST SURINAM MINERAL MAP

Surinam, one of the world's largest bauxite producing centers, is now being geologically mapped and surveyed by the Surinam Government Geological and Mining Service (GMD). The map above is the most recent geological map completed by the GMD. The column in the upper left lists the principal mine names with key symbols showing their geographic location. While the survey is being undertaken to locate any mineral resources within the country, it is also part of a program to increase known reserves of bauxite. During the survey, bauxite was discovered in the virgin area between the Nassau Mountain and the Surinam River, i.e. on the Wintiwai Mountain and on a second hitherto unknown mountain. The GMD diamond exploration program was extended into the area of Sabanpassie; field crews made preliminary investigations of the Brokopondo area. Test borings were also made of the clay deposit of La Vigilantia near Paranam to evalute its possibilities for supporting a ceramic industry.



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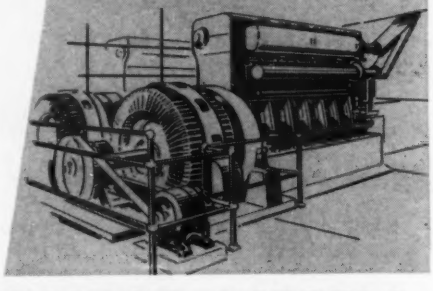

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for production at the Tsumbe copper-cobalt mine. New plans call for an initial production rate of 1,[illegible] tons per day instead of the original 2,200 tons per day. With the lower rate, output could be achieved at a lower capital cost, with expansion undertaken from eventual operating profits.

NORTHERN RHODESIA—Mineral output in 1952 was valued at approximately £79,254,000, an increase of more than £7,000,000 on the value of the 1951 output. Blister copper, amounting to 200,799 tons in 1952, was worth £45,371,000; 111,555 tons of electrolytic copper produced was worth £26,463,000. The amount of zinc produced in 1952 was 22,890 tons, valued at £3,792,000. Lead production totaled 12,600 tons, worth £1,740,500, and cobalt alloy amounted to 24,973 cwt., valued at £1,048,000.

SOUTH AFRICA—Drilling jointly with *Anglo American Corporation of South Africa*, borehole DS1 of *New Consolidated Free State Exploration Company Ltd.* on the farm Dirksburg 358 disclosed immediately above the Basal Reef horizon, several igneous intrusives more than 200 feet thick, between 5,811 feet and 6,105 feet levels. The Basal Reef at 6,114 feet in the original borehole and about the same depth in four deflections, yielded negligible gold values. The farm is part of the area immediately north of the *Harmony* mine, which seems likely to be consolidated into a mining property under the auspices of the *New Consolidated Gold Fields Group*.

FRENCH MOROCCO—*Societe des Mines de Zellidja*, partially owned by the *Newmont Mining Corporation*, continued successful operation of its mines during 1952, and of the Oued-el-Heimer lead smelter owned jointly with *Societe de Development Minier et Metallurgique de Penarroya*. The newly constructed mill attained its planned capacity of approximately 4,000 metric tons per day, and is operating satisfactorily at about 3,300 tons. *Societe Nord-Africaine du Plomb (N.A.P.)*, in which Newmont owns 31.8 percent, began development of a high-grade zinc orebody in October 1952 through an Algerian subsidiary. Initial production was expedited by the action of Zellidja in leasing to N.A.P. its No. 1 mill which was remodelled to treat 1,000 tons per day of N.A.P. ore; however, it proved impossible to attain production prior to the sharp decline in the price of zinc. N.A.P. hopes to attain unusually low production costs in 1953 because of the high grade of the ore and its excellent milling characteristics. Current production of about 300 metric tons daily is expected to reach 1,000 tons in 1953.

GOLD COAST—*Ariston Gold Mines (1929) Ltd.* reports that 330,430 tons of ore were crushed during 1952, equal to an output of 27,536 tons a month. This yielded 114,932 ounces of gold and a record revenue of £1,515,480. Since the close of the fiscal year, improved tonnage, profit, and revenue have resulted. Tonnage will be increased even further when the new hoist with a 40,000-ton monthly rating goes into operation. Ore reserves now exceed 3,000,000 tons, averaging 6.72 dwt. The ore recovery plant has been expanded to handle 40,000 tons a month.

CAMEROONS—The mining industry showed very little activity during 1952. Production figures were: 614 ounces gold, 4,500 ounces in 1951; 44 tons of tin ore, 103 in 1951; and 130 tons of rutile, 106 in 1951. The largest annual totals previously were 18,950 ounces gold in

1942; 356 tons of cassiterite in 1939; and 3,320 tons of rutile in 1944.

SOUTHERN RHODESIA—The new mill being constructed by *Rhodesian Vanadium Corporation* at the *Vanad* mine is scheduled to be completed by the third quarter of 1953. The company's reserves of chrome ore were substantially enlarged during 1952. Rhodesian Vanadium is a Subsidiary of Vanadium Corporation of America.

MADAGASCAR—France's first uranium processing plant reportedly was opened at Tananarive, Madagascar in February. It is to produce uranium from the *Vinaninkarena* mine under the French five-year plan for atomic energy development.

NORTH AMERICA

ALASKA—An agreement has been signed by the Defense Materials Procurement Agency with the *Kenai Chrome Company* of Anchorage for the development of a chromite deposit at Red Mountain on the Kenai Peninsula. The contract calls for the production of 13,000 long tons of chromite for which the government will pay $97.00 per ton. The DMPA will advance $200,000 to Kenai for working capital, and $110,000 for opening the mine and installing a loading dock and other facilities. The ore will be trucked 12 miles to Kasitsna Bay and then shipped by barge to Tacoma or Seattle, Washington. The government's specification calls for 48 percent ore with a chrome to iron ratio of 3:1. During World War II, 6,000 tons of ore were mined in this same area but were never shipped to the United States because of a lack of loading facilities.

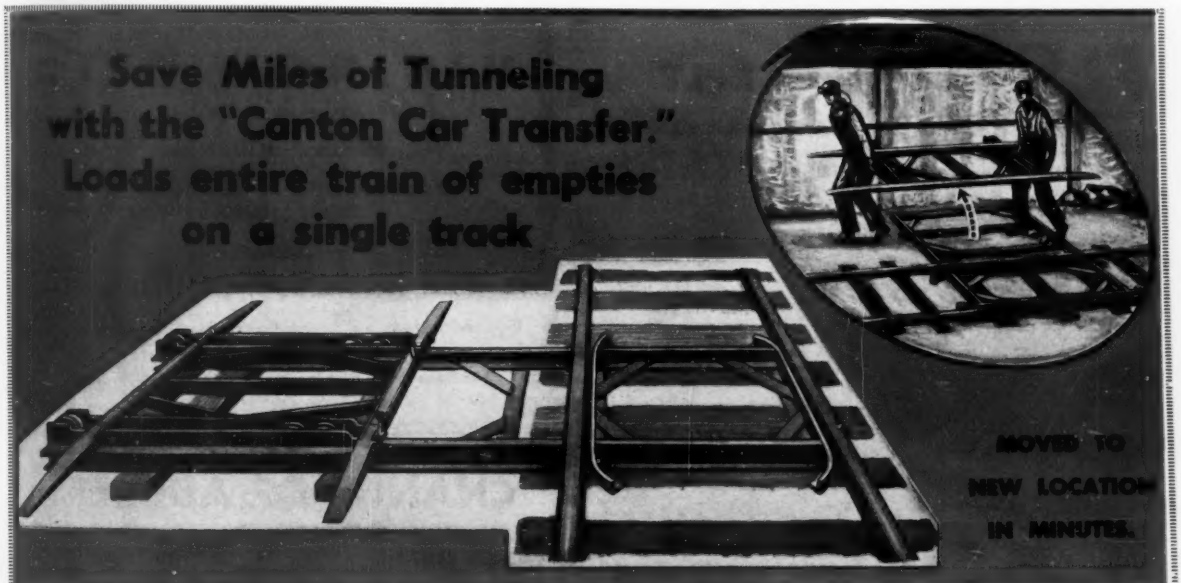
QUEBEC—The *Quebec Iron & Titanium Corporation* produced 37,626 gross tons of titanium from its deposit at Lac Tio, Quebec, in 1952. In 1951, it had produced only 17,259 gross tons. Ore mined and crushed totaled 237,249 gross tons in 1952, compared with 339,224 in 1951. Ore treated totaled 93,005 gross tons, compared with 12,877 in the previous year; iron and steel produced amounted to 28,948 gross tons, compared with 12,877 in 1951. Titanium slag shipped in 1952 was 34,739 gross tons, while in 1951 this amounted to only 7,179 gross tons. Quebec Iron & Titanium is owned two-thirds by *Kennecott Copper Corporation* and one-third by *New Jersey Zinc Company*.

ONTARIO—C. C. Huston, consulting engineer of the *Centre Lake Uranium Mines, Ltd.*, Bancroft, Ontario, reports that a program of diamond drilling is now under way at the mine. Work has been carried out on four showings with diamond drilling initiated on the main middle showing. This is about 950 feet long and from 10 to 70 feet wide. Drilling to 150-feet vertical depth is planned. A number of new radioactive showings have also been found, one of which may add 500 feet to the length of the main zone. The work at Centre Lake is financed 50 percent by the *Tungsten Corporation of Canada, Ltd.*

FLORIDA—*International Minerals & Chemical Corporation's* new triple superphosphate plant is now in operation about four miles west of Bartow, Florida. Extraction of uranium as a byproduct will not begin until later.

QUEBEC—*Dominion Asbestos Mines Limited* of St. Adrien de Ham has awarded a contract for mining a minimum of 1,000,000 tons of asbestos-bearing rock at its property to *Patrick Harrison & Co. Ltd.*, Montreal. Work on preparing the pit for mining will commence immediately and co-ordinated mining and milling operations are expected to be reached shortly. Over $500,000 worth of new equipment has been delivered to the property by Patrick Harrison, to enable the firm to mine at a rate so that production will be maintained at maximum capacity. Total capacity of the mill is rated at 2,200 tons daily, with an ultimate capacity of 4,000 tons daily.

NEW BRUNSWICK—M. J. Boylen, president of the *Brunswick Mining and Smelting Corporation, Ltd.*, has announced plans for the construction during 1953 of separate concentrators on the *Brunswick* and *Keymet* properties near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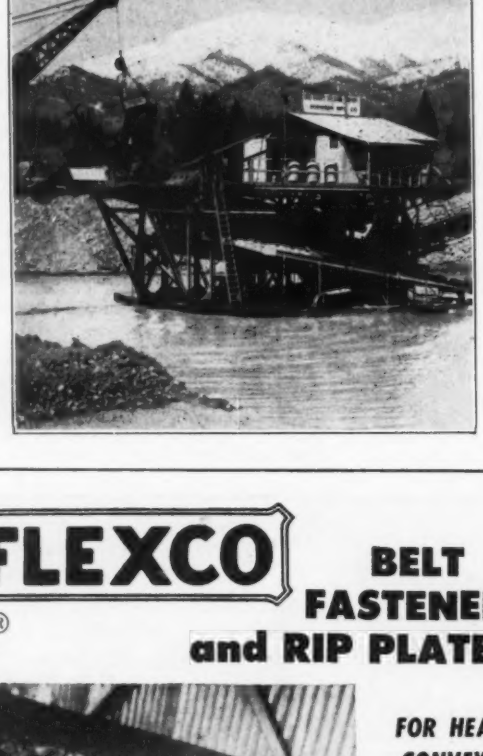

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Bathurst. Deep drilling on the Brunswick holdings have shown widths up to 300 feet, with the ore core exceeding all expectations. The company now has seven drilling workings with about 100 men employed in surveying and drilling. *Keymet Mines, Ltd.*, Mr. Boylen reports, has completed its shaft sinking, has three stations cut, and is concentrating on blocking out ore. Mr. Boylen's companies have opened a customs assay office in Bathurst, New Brunswick.

QUEBEC—Latest progress report on diamond drill results at the Waden Bay copper-gold development of *Anglo-Rouyn Mines Ltd.* shows both "A" and "B" ore zone lengthened to 1,800 feet and 1,700 feet, respectively, to date, with both western and eastern ends of zones still open. In the "A" Zone sector, drill hole sequence is west. Hole No. 69, bottomed at 282 feet, obtained an over-all core length of 21.3 feet of copper mineralization, now under assay. A 10-foot section of this core assayed 2.22 percent copper. In the "B" ore zone, separated from "A" zone by a 300-foot swamp, drilling is proceeding easterly with holes spotted in the main, at 100-foot intervals. Hole No. 103 cut 24 feet of chalcopyrite mineralization, a 14-foot length of which returned 2.58 percent of copper. Three drills are detailing the exploration-development program, and the company is now considering the possibilities of underground development plans for the coming season.

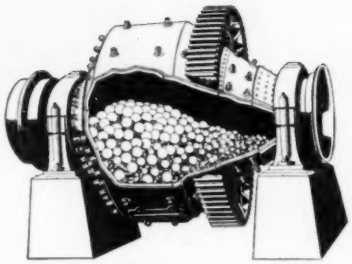
ONTARIO—*New Alger Mines, Ltd.* has signed a contract with *Subterra Drilling Company* to initiate a diamond drilling program on its *Sudbury* properties. These properties lie to the southwest of the *Gertrude* and *Creighton* mine of *International Nickel Company of Canada, Ltd.*, and mapping has shown an important fault system entering New Alger ground. Anomalies related to these faults have been outlined by geophysical work and plotted to determine drill locations.

OREGON—*Harvey Machine Company* of Torrance, California has purchased an alumina plant at Salem, Oregon from the General Services Administration. The plant was constructed during World War II as an experimental pilot plant to determine whether alumina could be made from clay-bearing ores. Harvey is expected to continue this work.

SASKATCHEWAN — *Consolidated Rochette Mines Ltd.* and *Norgold Mines Ltd.* have acquired 24 uranium claims in the Milliken Lake area of northern Saskatchewan. Each company holds a 50 percent interest; plans are being made to begin exploration work as soon as possible.

NEW BRUNSWICK—*North Trinity Mining Corporation Ltd.* has acquired 20 claims on base metals in the Bathurst district of New Brunswick, Canada, and proposes to conduct a ground survey, exploration, and drilling program this spring.

QUEBEC—J. A. Retty, president of *Fenimore Iron Mines Ltd.* reports that the potential reserves of Fenimore, located on the Labrador trough of Northern Quebec, must be measured in "hundreds of millions of tons of concentrating material." This material occurs on tidewater and also crops out intermittently on the 112-mile length of the company's holdings. The three main areas of interest are: Gossan Hill; Dragon Lake-Irony Lake-Finger Lake; and Finger Lake-Leaf Lake-Mannic Lake. At Gossan Hill, the occurrence is represented by a hill almost one mile long and up to 3200 feet across, with a summit of 167 feet above ground. A 700-pound bulk sample from Gossan Hill ran 27.5 percent iron, 26.2 percent SiO_2, 5.70 per-



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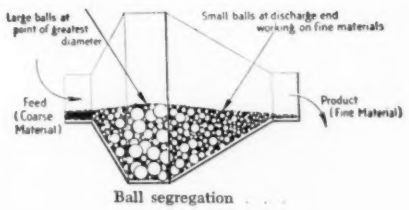
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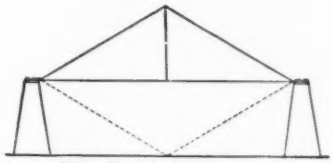

Truss-like structure . . .

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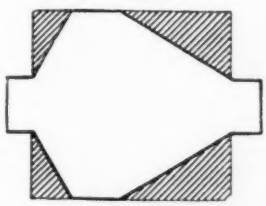

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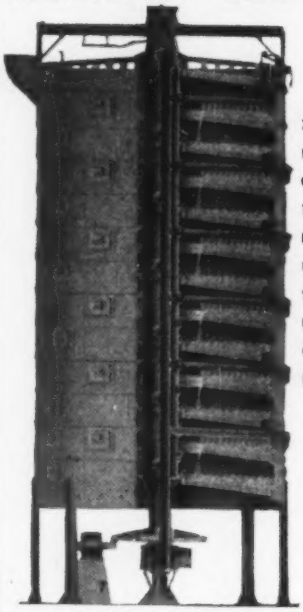

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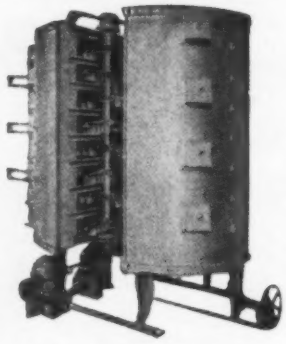

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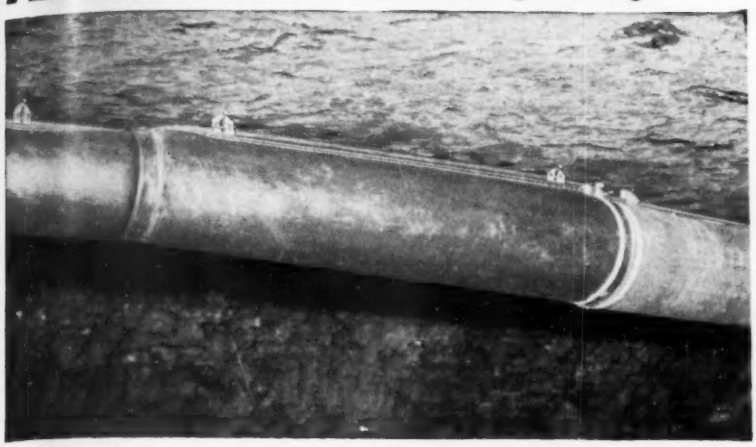

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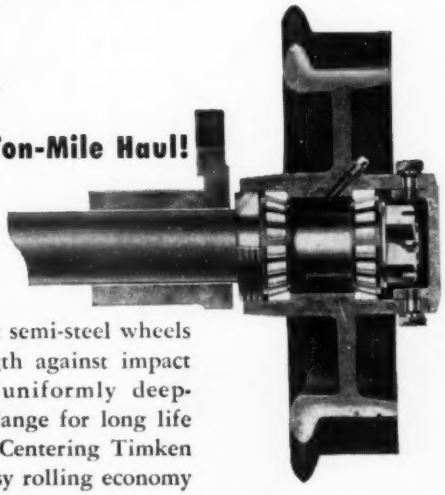

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NEW BRUNSWICK—*Anacon Lead Mines Ltd.* has made an offering of rights for purchase of *Keymet Mines Ltd.* shares on the basis of one share at 35 cents for each five Anacon shares held. The offering is being made only to shareholders in Canada. Keymet Mines, located in the Elm Tree district of New Brunswick, has nearly completed a shaft on its property to its objective of 500 feet, preliminary to opening three levels at 150-foot intervals. R. J. Isaacs and W. C. Ringsleben, consulting engineers, estimate indicated ore reserves at 125,000 tons averaging 6.75 percent lead, 8.21 percent zinc, and 2.87 ounces silver per ton. The mining plant, with the addition of one compressor, would support an underground operation of 200 tons a day and with minor additions could support a 500-ton operation. Underground development on three levels is expected to be completed by June 1953. Grade of ore indicated is such that under proper management and prevailing metal prices the mine can be operated to show a good return on capital invested, the engineers report.

ONTARIO—A third furnace is in the process of being installed at the *Falconbridge Nickel Mines Ltd.* All necessary equipment and supply items are now at the smelter. Ore from the new *Hardy* mine—now being geared for an output of 1,000 tons daily—will be treated primarily in this new furnace. Falconbridge has started construction of a road into its *Fecunis Lake* property in preparation for large-scale development of this mine. Recent drilling has disclosed ore in excess of 10,000,000 tons of better than average mine grade ore. Falconbridge recently completed an agreement with *Junior Frood Mines Ltd.*, whose property is located in Blezard township, whereby Falconbridge will spend $500,000 on nickel exploration of this property over a five-year period.

ONTARIO—*Algoma Ore Properties' Helen* mine will soon be producing iron ore at the rate of more than 7,500 tons daily to maintain maximum output at the company's new sinter plant now nearly completed. The mine is already ranking as one of Canada's largest underground operations.

SASKATCHEWAN—*New Hugh Malartic Mines'* officials plan to lay out a surface program for its nine-claim group, adjoining *Pole Star Mines* and *Fairbanks Uranium Mines* in the Marin Lake sector of the Beaverlodge Lake uranium district. A geological reconnaissance survey was carried out last fall.

YUKON TERITORY—*Ankeno Mines Ltd.* has let a new contract for an additional 1,000 feet of lateral work on its *Keno Hill* property in the Yukon. The work will follow up an earlier 1,500-foot program.

ONTARIO—*Callinan Flin Flon Mines Ltd.* is preparing to begin a diamond drill test on its *McVittie-Cryderman* option, adjoining *Trillabele property* in Trill township, Sudburg district. At present, lines are being cut for a magnetometer survey to follow.

SASKATCHEWAN—Ten samples taken by *Seven Island Mining & Exploration Corporation Ltd.*, have returned encouraging uranium assays from its 800-acre property 18 miles north of Seven Islands. Assays from surface samples completed thus far are as follows: 0.66 percent U_3O_8 uranium oxide equivalent; 0.67 percent,

0.059 percent, 0.048 percent, 0.006 percent, 0.82 percent, 3.11 percent, 1.59 percent, 0.54 percent and 0.53 percent.

IDAHO—The *Bunker Hill & Sullivan Mining and Concentrating Company* will deepen its present 1,200-foot shaft an additional 2,000 feet at the old *Crescent* mine in the Coeur d'Alene district. This is part of a $1,098,750 exploration program to be financed jointly by the firm and the Defense Minerals Exploration Administration.

BRITISH COLUMBIA—New York, California, and Alberta oil interests have made a firm commitment to provide $270,000 to expedite successful underground development of *Cariboo Gold Quartz Mining Company, Ltd.'s* mine near Wells, in the Cariboo district. President W. B. Burnett says there is no intention to operate the 450-ton mill at full capacity until there is an adequate return per ounce of gold to earn a profit for shareholders. Alex Shaak is general manager.

SASKATCHEWAN—It is reported that 400,000 shares of *Goldfields Uranium Mines Ltd.* have been underwritten by Pitfield & Co. at 70 cents a share. Goldfields has now mapped out a program of exploratory drilling for its Beaverlodge Uranium properties. Three drill rigs are to be employed. The first drill has already started in the Medusa Lake sector where there is a wide indicated radioactive zone. A second drill will be employed on what is known as No. 62 radioactive showing which it is desired to extend. At present, this shows a length of 80 feet averaging 6.4 pounds U$_3$O$_8$ over 8 feet. The third drill will be used to investigate a two-mile length of the St. Louis fault where it traverses the company's property.

MANITOBA—*Copper-Man Mines Ltd.*, located in the Herb Lake section of Manitoba, reports completion of a deep drilling program which confirmed the downward extension of its copper-zinc ore zone. Hole No. 41, drilled vertically, indicated 17.8 feet of mineralization at the 410-foot level, assaying 2.05 percent copper and 3.60 percent zinc. Of this core section, the best 12.8 feet averaged 2.38 percent copper and 4.54 percent zinc. The zone, about 90 feet long and 20 feet wide, dips at an angle of 46°. The current drilling indicated that the zone continues to at least 550 feet down dip with a corresponding increase in tonnage. Copper-Man Mines also plans further exploration of its property in the Beaverlodge uranium camp in Saskatchewan. This property comprises nine claims adjoining the northern boundary of *Eldorado Mining and Refining (1944) Ltd.* and the western boundary of *Nesbitt-La Bine Mines Ltd.*

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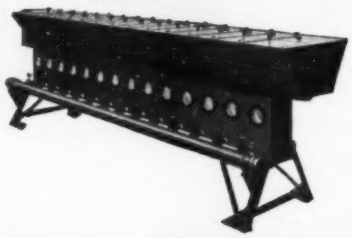

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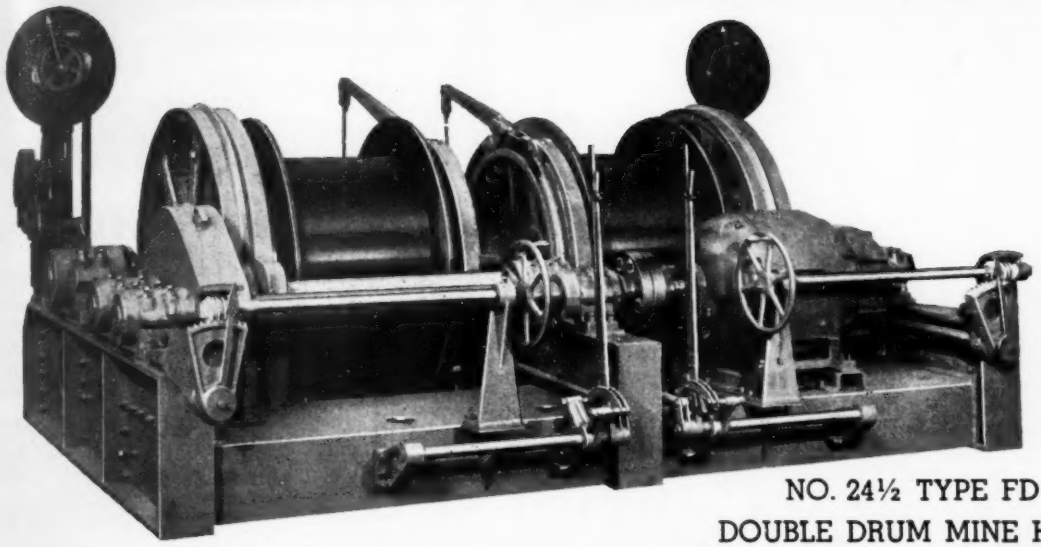

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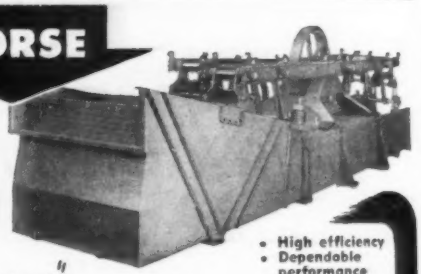

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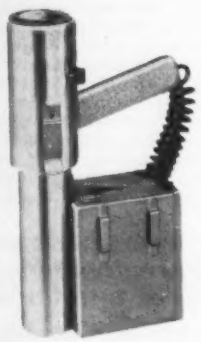

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U.S.A. Metal & Mineral Prices

METALS

APRIL 23, 1953

COPPER:	**Electrolytic.** Delivered F.o.b. cars, Valley basis	30.00
	Lake. Delivered, destinations U.S.A.	33.00¢
	Foreign Copper. Valley basis	32.00¢-36.50¢
LEAD:	**Common Grade.** New York	12.00¢
	Tri-State Concentrates, jig, flotation 80% lead, per ton	$152.10
ZINC:	**Prime Western.** East St. Louis	11.00¢
	Tri-State Concentrate, 60% zinc, per ton	$65.00
ALUMINUM:	**Primary 30 pound ingots (99% plus).** F.o.b. shipping points	20.50¢
ANTIMONY:	**Lone Star Brand.** F.o.b. Laredo, in bulk	35.00¢
BISMUTH:	(In ton lots) price per pound	$2.25
CADMIUM:	**Sticks and bars.** 1 to 5 ton lots (Price per pound)	$2.00
COBALT:	**97-99%,** keg of 550 pounds (Price per pound)	$2.40
MAGNESIUM:	**Ingots (99.8%).** F.o.b. Freeport, Texas	27.00¢
MERCURY:	**Flasks.** Small lots, New York	$201.00-$195.00-$197.00
NICKEL:	**"f" Ingots (5 pounds).** F.o.b. refinery, Port Colburne, Ontario	60.00¢
TIN:	**Grade A Brands.** New York (Price per pound)	121.50¢
TITANIUM:	**99.3% + (Price per pound)**	$5.00-$7.00
GOLD:	United States Treasury price	$35.00 per ounce
SILVER:	**Newly mined domestic.** United States Treasury price	90½¢ per ounce
	Foreign Handy & Harman	85.25¢ per ounce
PLATINUM:		$90.00-$93.00 per ounce
ZIRCONIUM:	Powder, 100 pound lots, per pound	$7.00

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BERYLLIUM ORE:	10 to 12% BeO. F.o.b. mine, **Colorado**	$43.00 per unit
	Small lot purchases at Custer, S. D., Spruce Pine, N. C., and Franklin, N. H. Visual inspection at $400.00 per short ton or by assaying at: 8.0 to 8.9% BeO, $40 per unit; 9.0 to 9.9%, $45; over 10.0% $50.	
CHROME ORE:	F.o.b. railroad cars eastern seaports. Long tons dry weight.	
	African (Rhodesian). 48% Cr_2O_3. 3 to 1 Ratio.	$44.00-$46.00
	African (Transvaal). 48% Cr_2O_3. No Ratio.	$34.00-$35.00
	Turkish. 48% Cr_2O_3. 3 to 1 chrome-iron ratio	$54.00-$56.00
	U. S. Government ore purchase depot Grants Pass, Oregon, Base price, lumpy ore, $115.00; fines and concentrates $110.00 for 48% Cr_2O_3 and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr_2O_3.	
COLUMBIUM-TANTALUM ORE:	At United States small lot beryl purchase depots. $3.40 per pound contained combined pentoxides in 50% ore.	
IRON ORE:	Lake Superior. Per gross ton Lower Lake Ports.	
	Mesabi, Non Bessemer, 51.5% Fe. Second quarter	$9.70
	Mesabi, Bessemer, 51.5% Fe. Second quarter	$9.85
	Old Range Non Bessemer. Second quarter	$9.95
	Old Range Bessemer. Second quarter	10.10
	Swedish, Atlantic Ports, 60 to 68% Fe, Contracts, Per Unit	20.00¢
MANGANESE ORE:	**Metallurgical grade. 46 to 48% Mn. Long ton unit**	$1.20-$1.22
	Chemical grade. 80% MnO_2. Per ton	$70.00
	U. S. Government ore purchasing depots: Deming, New Mexico; base price $2.30 per long dry ton unit of recoverable manganese less handling and treatment costs. Wenden, Arizona; base price of $8.54 per long dry ton of 15% manganese ore. Butte, Montana; (black and pink ores) base prices of $4.87 per long dry ton of 18% manganese ore. Phillipsburg, Montana; base price of $6.43 per long dry ton unit of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) $2.30 per unit with premiums and penalties.	
MOLYBDENUM CONCENTRATE:	**90% MoS_2. F.o.b. Climax, Colorado. Per pound of contained molybdenum, plus cost of containers**	$1.00
TUNGSTEN CONCENTRATE:	**Domestic. 60% WO_3 Per short ton unit**	$65.00
	Foreign. 65% WO_3, Per short ton unit	$50.00
URANIUM ORE:	**Carnotite-Roscoelite. F.o.b. purchase depot plus $0.06 per ton mile ($6.00 maximum), Grand Junction, Rifle, Durango, Naturita, and Uravan, Colorado. Salt Lake City, Marysvale, Thompsons, and Monticello, Utah. Shiprock, New Mexico, Edgemont, S. Dakota. Base price for 0.10% ore is $1.50 per pound and up to $3.50 per pound of contained U_3O_8 plus $0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of $0.25 per pound for each in excess of 10 pounds. A $0.50 per pound development allowance paid on all ores purchases. At Shiprock all ores with more than 6% lime are penalized for excess lime.**	
VANADIUM ORE:	**Carnotite-Roscoelite. V_2O_5 in ratio of more than 10 parts to 1 part of U_3O_8 are generally acceptable at all AEC depots, but excess not paid for at Marysvale, Monticello and Shiprock. . . . Per Pound V_2O_5,**	$0.31

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	Acid grade. 97% CaF_2	$60.00
PERLITE:	**Crude:** F.o.b. mine per short ton	$3.00 to $5.00
	Plaster grades. Crushed and sized. F.o.b. plants	$7.00 to $9.00
SULPHUR:	Long ton, F.o.b. Hoskins Mound, Texas	$25.50
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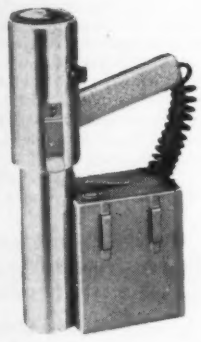

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	Tri-State Concentrates, jig, flotation 80% lead, per ton	$152.10
ZINC:	Prime Western. East St. Louis	11.00¢
	Tri-State Concentrate, 60% zinc, per ton	$65.00
ALUMINUM:	Primary 30 pound Ingots (99% plus). F.o.b. shipping points	20.50¢
ANTIMONY:	Lone Star Brand. F.o.b. Laredo, in bulk	35.00¢
BISMUTH:	(In ton lots) price per pound	$2.25
CADMIUM:	Sticks and bars. 1 to 5 ton lots (Price per pound)	$2.00
COBALT:	97-99%, keg of 550 pounds (Price per pound)	$2.40
MAGNESIUM:	Ingots (99.8%). F.o.b. Freeport, Texas	27.00¢
MERCURY:	Flasks. Small lots, New York	$201.00-$195.00-$197.00
NICKEL:	"F" Ingots (5 pounds). F.o.b. refinery, Port Colburne, Ontario	60.00¢
TIN:	Grade A Brands. New York (Price per pound)	121.50¢
TITANIUM:	99.3% + (Price per pound)	$5.00-$7.00
GOLD:	United States Treasury price	$35.00 per ounce
SILVER:	Newly mined domestic. United States Treasury price	90½¢ per ounce
	Foreign Handy & Harman	85.25¢ per ounce
PLATINUM:		$90.00-$93.00 per ounce
ZIRCONIUM:	Powder, 100 pound lots, per pound	$7.00

ORES AND CONCENTRATES

BERYLLIUM ORE:	10 to 12% BeO. F.o.b. mine, Colorado	$43.00 per unit
	Small lot purchases at Custer, S. D., Spruce Pine, N. C., and Franklin, N. H. Visual inspection at $400.00 per short ton or by assaying at: 8.0 to 8.9% BeO, $40 per unit; 9.0 to 9.9%, $45; over 10.0% $50.	
CHROME ORE:	F.o.b. railroad cars eastern seaports. Long tons dry weight.	
	African (Rhodesian). 48% Cr_2O_3. 3 to 1 Ratio.	$44.00-$46.00
	African (Transvaal). 48% Cr_2O_3. No Ratio.	$34.00-$35.00
	Turkish. 48% Cr_2O_3. 3 to 1 chrome-iron ratio	$54.00-$56.00
	U. S. Government ore purchase depot Grants Pass, Oregon, Base price, lumpy ore, $115.00; fines and concentrates $110.00 for 48% Cr_2O_3 and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr_2O_3.	
COLUMBIUM-TANTALUM ORE:	At United States small lot beryl purchase depots. $3.40 per pound contained combined pentoxides in 50% ore.	
IRON ORE:	Lake Superior. Per gross ton Lower Lake Ports.	
	Mesabi, Non Bessemer, 51.5% Fe. Second quarter	$9.70
	Mesabi, Bessemer, 51.5% Fe. Second quarter	$9.85
	Old Range Non Bessemer. Second quarter	$9.95
	Old Range Bessemer. Second quarter	10.10
	Swedish, Atlantic Ports, 60 to 68% Fe, Contracts, Per Unit	20.00¢
MANGANESE ORE:	Metallurgical grade. 46 to 48% Mn. Long ton unit	$1.20-$1.22
	Chemical grade. 80% MnO_2. Per ton	$70.00
	U. S. Government ore purchasing depots: Deming, New Mexico; base price $2.30 per long dry ton unit of recoverable manganese less handling and treatment costs. Wenden, Arizona; base price of $8.54 per long dry ton of 15% manganese ore. Butte, Montana; (black and pink ores) base prices of $4.87 per long dry ton of 18% manganese ore. Phillipsburg, Montana; base price of $6.43 per long dry ton unit of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) $2.30 per unit with premiums and penalties.	
MOLYBDENUM CONCENTRATE:	90% MoS_2. F.o.b. Climax, Colorado. Per pound of contained molybdenum, plus cost of containers	$1.00
TUNGSTEN CONCENTRATE:	Domestic. 60% WO_3 Per short ton unit	$65.00
	Foreign. 65% WO_3, Per short ton unit	$50.00
URANIUM ORE:	Carnotite-Roscoelite. F.o.b. purchase depot plus $0.06 per ton mile ($6.00 maximum), Grand Junction, Rifle, Durango, Naturita, and Uravan, Colorado. Salt Lake City, Marysvale, Thompsons, and Monticello, Utah. Shiprock, New Mexico, Edgemont, S. Dakota. Base price for 0.10% ore is $1.50 per pound and up to $3.50 per pound of contained U_3O_8 plus $0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of $0.25 per pound for each in excess of 10 pounds. A $0.50 per pound development allowance paid on all ores purchases. At Shiprock all ores with more than 6% lime are penalized for excess lime.	
VANADIUM ORE:	Carnotite-Roscoelite. V_2O_5 in ratio of more than 10 parts to 1 part of U_3O_8 are generally acceptable at all AEC depots, but excess not paid for at Marysvale, Monticello and Shiprock. . . . Per Pound V_2O_5, $0.31	

NON-METALLIC MINERALS

BENTONITE:	Minus-200-mesh. F.o.b. Wyoming points. Per ton in carload lots	$12.50
	Oil Well grade. Packed in 100 pound paper bags	$14.00
FLUORSPAR:	Metallurgical grade. 70% effective CaF_2 content per short ton F.o.b. Illinois-Kentucky mines	$42.50
	Acid grade. 97% CaF_2	$60.00
PERLITE:	Crude: F.o.b. mine per short ton	$3.00 to $5.00
	Plaster grades. Crushed and sized. F.o.b. plants	$7.00 to $9.00
SULPHUR:	Long ton, F.o.b. Hoskins Mound, Texas	$25.50
	Export,	$30.50

Quotations on metals and certain ores through the courtesy of *American Metal Market*, New York, N.Y.

PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill, or smelter. This PEP section is MINING WORLD'S way of making available to you some of the finest current information on mechanization.

Revolutionary Turbo-Mill Introduced from Germany

Mining engineers and equipment manufacturers are currently studying a new and radically different grinding and pulverizing machine which will handle a

wide variety of ores, industrial minerals and other products.

The Turbo-Mill was developed by Ludwig Pallmann of Zweibruecken, Germany, just after the war and was recently displayed and demonstrated at the Frankfurt fair in 1951. A. E. Poulsen & Company of Los Angeles has been appointed exclusive distributor of the machine for the United States and Canada. The manufacturers state that approximately 500 installations of the machine have been made in Europe in the past two years, and that production of the unit has now been sufficiently increased to permit export to the U. S.

The machine utilizes the four known principles of grinding and pulverizing through compression, impact, attrition and cutting. The ricochet action of the wind pulverizing rocks and sands is employed, with miniature wind storms of 360 ft. per second being generated and controlled within the mill. Materials can be reduced to the finest powder, according to the manufacturer. Complete information on the Turbo-Mill can be obtained from A. E. Poulsen & Co. of Los Angeles, or by circling No. 41.

IT'S NEW (No.) CIRCLE IT

New Feed Weigher for Fine Material

The Sintering Machinery Corporation, Transportometer Division, has designed a new feed regulating Transportoweigher for automatically and continuously transporting, weighing and maintaining pre-set rate of feed of any finely divided material in the chemical and processing industries, smelting and refining, mining, and other industries requiring continuous weighing and feed regulating of fine materials. Photograph shows a 24" belt, feed regulating Transportoweigher designed to handle ground phosphate rock, 55% minus 200 mesh and weighing approximately 75 lbs./cu. ft. This particular machine will be operated at pre-set capacities between 10 and 24 short tons per hour. A knurled feed rate setting handwheel mounted inside the dust tight scale cabinet presets the capacity to any rate within the 10-24 tons/hour range. The integrator records on a direct reading tonnage totalizer the tonnage passing over the belt; the tonnage indicator, calibrated 0 to 100% of capacity, indicates the instantaneous weighing rate. The tonnage indicator can be calibrated in tons/hour, lbs./min., or any special scale reading, as desired. The weight integrator, mounted in the dust tight cabinet, is a completely mechanical, gear differential type. For further information circle No. 42.

Improved Denver Sampler Incorporates Simplicity

The new design of the Denver Automatic Sampler gives A-B-C simplicity and is an improvement over other intermittent type automatic samplers for wet or dry

sampling, according to the manufacturer.

One of the accomplishments has been to eliminate complicated wiring circuits. As shown in the photo, the new Denver Automatic Sampler uses only one limit switch. All wiring is enclosed in flexible conduit. Time switch and all terminal connections are in one enclosure.

A gear motor operates only at intermittent intervals controlled by motor-driven time switch which may be easily set for intervals varying from 2 to 55 minutes in one minute intervals. A positive drive roller chain moves the cutter assembly on ball-bearing wheels along the carrier track. Elimination of sliding contact between cutter and carrier means less maintenance and assures more accurate sampling.

Standard Denver Automatic 21" Samplers are kept in Denver stock and inquiries will receive prompt attention. A flowsheet showing location of Denver Samplers for best possible mill control will be sent on request. Circle No. 44.

New Permanent Magnet Separator Introduced

An addition to its line of electro-magnetic and permanent magnet separators has been announced by F. W. Shrader Company of Culver City, California.

The new unit is identified as Type SPD and is specially designed for removing iron from material discharged from the "throw out" of a Raymond Roller Mill. In many industrial processes in connection with ceramics, chemicals and minerals it is essential that all traces of ferrous contaminations be removed from finely ground material.

With the new Shrader SPD separator, purified material may be automatically returned to mill for further grinding or discharged outside. The unit does not require supervision or periodical cleaning and may be adapted to many other applications at different points of material flow. For further information circle 70.

MINERALIGHT YOUR WAY TO NEW DISCOVERIES: Ultra Violet Products' Mineralight instantly detects tungsten, mercury, and other valuable minerals. There's a model for every requirement. And if you'd like a specimen sample from the first atomic blast at Alamogordo, New Mexico, just send 25¢ to Ultra Violet Products, Inc., 145 Pasadena Ave., South Pasadena, California. A quick note to the same address will bring you the company's brochure MW "Prospecting for Scheelite (tungsten) with Ultra-Violet." Or you can get a copy by circling no 1.

AUGERS FOR FASTER DRILLING: McCarthy vertical and horizontal auger drills have increased pit production for many operators. Get information on the advantages these units offer in blast hole drilling and subsoil testing by circling no. 2.

HARD-FACING GUIDEBOOK: This is the recently revised guidebook originally published by the Stoody Company some years ago. It's a must for any maintenance library now that rebuilding and hard-facing are standard procedures throughout mining and milling. Circle no. 3.

NEED A NEW YORK ALL-PURPOSE AGENT? Miners outside the U. S. should get further information on this service offered by South American Minerals & Merchandize Corp. The company's large staff of engineers and financial experts will buy your ore, purchase supplies and even engineered items. And they'll save you money in the process. Circle no. 34.

PORTABLE COMPACT pH CONTROL: New savings, new speed and production advantages are provided by the new completely portable Beckman Model N pH meter. The instrument incorporates a built-in ruggedness that adapts it for use anywhere without depending on outside power circuits. For information circle no. 4.

BETTER GRINDING WITH LESS UPKEEP: Traylor mills are built with new Meehanite bearings to overcome the wear problems caused by excessive starting torque. For full information on the advantages and uses of Traylor ball, rod, and compartment mills, get Traylor bulletin 7121 by writing Traylor Engineering & Mfg. Co., 533 Mill St., Allentown, Pa. or by circling no. 5.

SMELTING ON SITE: Mace furnaces and sintering hearths save high transportation and treatment charges on your ores and concentrates by smelting at the mine or mill site. Get the new Mace catalog by circling no. 6.

NEW VERTICAL AGITATOR DRIVES: Special bulletin issued by Western Gear Works of Seattle covers complete line of vertical agitator drives for application on any type of metallurgical or chemical agitator tank. A special feature is that the driving motor is an integral part of the unit which offers space saving advantages over the usual right angle drives. To obtain copy of bulletin circle no. 7.

LOW COST CONCENTRATION: The Humphreys Spiral offers the maximum in flexible, efficient concentration with the lowest possible maintenance and repair—there are no moving parts. Humphrey's services include a complete testing laboratory. Get full details by circling no. 8.

BETTER GRINDING WITH LESS UPKEEP: Traylor mills are built with new Meehanite bearings to overcome the wear problems caused by excessive starting torque. For full information on the advantages and uses of Traylor ball, rod, and compartment mills, get Traylor bulletin 7121 by writing Traylor Engineering & Mfg. Co., 533 Mill St., Allentown, Pa. or by circling no. 9.

8-YARD CRAWLER-MOUNTER DRAGLINE: Harnischfeger's new dragline, reportedly the biggest ever mounted on two crawlers, affords smooth, fast operation through Magnetorque controls. For full details, circle no. 10.

CLOSER MINING CONTROL: Farmers Engineering and Mfg. Company has designed a phone system specifically for underground mining operations where close control is essential for efficient production. Get the company's bulletin 25 on this new Femco development by circling no. 11.

NARROW GAUGE DIESEL SWITCHER: Baldwin-Lima-Hamilton Corporation is building a new Diesel locomotive in gauges from 30 to 66 inches for plant switching service. The new unit weighs 25 tons, has a starting tractive effort of 17,500 pounds. Speeds are 10.6 and 28.0 miles per hour. Circle no. 12.

PAYLOADER—THE MINER'S HANDY MAN: The big 1½-yd. model HM Payloader has proven itself a valuable and versatile earth mover in and around mines and mills. It can excavate, strip, load, backfill, bulldoze, spread, pull, push, lift and carry. A Payloader catalog describes this and smaller units. Circle no. 13.

GAS TURBINES: "The Combustion Gas Turbine and Its Application" is the title of a new release by General Electric. It discusses the theory and uses to which turbines have been put as well as possible uses for future models. Power generators, locomotives, and pipeline pumping are some of the successful present installations. For a copy, circle no. 14.

PROTECTED PIT POWER: Westinghouse has published a book that covers the proper use, installation and protection of electric power in open-pit mines from source to ultimate load. Ratings of transformers, shovel performance, power factor correction, and distribution-system layouts for different types of mines are covered in the first part of the book. The second part is devoted to various systems of ground protection, what equipment is necessary in well-designed distribution systems, and where this equipment should be located. Circle no 15.

BETTER BEARING SERVICE: Mechanical stability, resistance to breakdown, and longer service life have given Shell Oil's lithium grease wide applications wherever bearing lubrication is required. To get more information on how multi-purpose lithium grease has replaced over 20 standard products, circle no. 16.

THROWAWAY BIT SERVICE: The Throwaway Bit Company maintains a complete service department for the reference of potential Throwaway bit users who are interested in testing performance in their own mine or for instructing miners in the use of Throwaway bits. For further information, circle no. 17.

ONE DRILL STEEL DOES THE WORK OF TWO: Timken multi-use and carbide insert bits fit the same drill steel. You can now change bits on the job as the ground conditions require. Lower inventories and higher drilling time per shift are only two of the advantages of Timken's system. Circle no. 18.

Circle numbers and mail this card for free product literature

To get further information on any item described in the Production Equipment Preview, note the key number of that item, circle the corresponding number on the PEP card at the right, and mail. If mailed from a point outside the United States, proper postage must be used.

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GRINDING BALLS WHAT AM: Sheffield's Moly-Cop grinding balls give longer service, lower grinding costs, fewer chargings, and less down time. They're proven more years of use in many of the world's most successful milling installations. Circle no. 20.

FILTER FABRICS: Due to a time-tested combination of virgin wool and synthetic fibers, FumeAll fabrics have the superior filtering characteristics of all-wool cloths and the strength as well as the heat, alkali, acid and moisture-resistance of synthetic materials. For samples and additional details, circle no. 21.

MORE SCREEN AREA PER SQ. INCH: Hendrick Mfg. Company's uniquely designed Wedge-Slot screen nearly doubles the efficiency of a given area of mesh. Stainless steel bars with a V-shaped profile can be used in smaller sizes than conventional bars—therefore, more apertures of a given size per square inch. For more information, circle no. 22.

LEARN EFFICIENT FURNACE USE: Pittsburgh Lectromelt Funace Corporation has published a new book on the many applications of electric furnaces. Be informed on the overall cost reductions possible with proper furnace use in both the ferrous and non-ferrous fields. Circle no. 23.

LIGHT-WEIGHT PIPE FOR MINING: A new bulletin has been released showing typical applications of Naylor Lockseam Spiralweld pipe in the mining, construction, oil and related industries. For a copy circle no. 24.

NEED NEW OIL FILTERS? If you do, check with the Winslow Engineering Company, pioneers of full-flow filtration, by getting the company's new booklet with full information on this filtering method. Circle no. 25.

SHOVEL MANUAL: A 32-page book published by the Koehring Company is a truly valuable and complete guide to the "Use and Application of Power Cranes and Shovels." From basic principles to detailed cost records, it covers every phase of crane and shovel use. For a free copy, circle no. 26.

BLASTER BOOK: A new 20-page Atlas book contains a wide variety of valuable data on the applications and methods of Rockmaster milli-second delay blasting in pits and mines. Get a free copy by circling no. 27.

DUST RECOVERY PROBLEM ANSWERED: Western Precipitation Corporation is the only organization with years of know-how in both electrical and mechanical methods of recovery. Get the full information on how this experience can be made readily available to answer any of your dust problems. Circle no. 28.

CONE DRIVE GEARS FOR MINING: This is the title of a new four page brochure issued by the Cone Drive Gears Division of the Michigan Tool Co. of Detroit. Typical applications of Cone-Drive double-developing worm gear sets and speed reducers in equipment for lead, zinc and coal mines are described and illustrated. A copy may be obtained by circling no. 65.

DOUBLE ROLL CRUSHER CATALOG: Smith Engineering Works of Milwaukee have just released new catalog literature, No. 282, on their three sizes of roll crushers, especially designed for reducing large capacities of intermediate or fine ores at low reduction ratios. Circle no. 66.

VISIBLE SPECTROPHOTOMETERS: A new Beckman catalog describes and pictures the complete line of Beckman ultraviolet and visible spectrophotometers—precision instruments that measure and identify substances by passing light through them. For your copy, circle no. 30.

4-CYCLE DIESEL POWER: Lister stationary Diesels are available in four and six cylinder models ranging from 36 to 54 bhp. Some of their outstanding features are chrome-hardened cylinder liners, individual fuel-injection pumps for each cylinder, and oversize crankshafts. For more information on these easy starting engines, circle no. 31.

ALLOY GUIDEBOOK: The Haynes Stellite Company has just published a 40-page guidebook on the correct use of welding and fabricating alloys. Make this valuable addition to your shop library by circling no. 32.

BULLDOZERS FOR EVERY NEED: Caterpillar's latest bulletin covers the many uses to which Cat bulldozers have been put. It further explains the variety of models available with detailed specifications and operating data. Circle no. 33.

MINE LUBRICANTS: E. F. Houghton & Co. has prepared a 12-page booklet especially for mining men, "Houghton's Recommended Mine Lubricants." The material it contains is directed particularly to those concerned with the mining, milling, and smelting of non-ferrous metals and includes recommendations for all types of equipment used in such operations. Circle no. 37.

BETTER, CHEAPER STEMMING: Save expensive powder and cut stemming time to seconds by using the new Quick-Seal Tamping plugs made by the National Mine Service Company. A brochure is available that describes methods and uses of the new plugs; get your copy by circling no. 38.

SLACK- AND TAUTLINE EQUIPMENT: Sauerman has long been a name that stands for the finest in power scraper excavating equipment. The company's latest publication describes their complete line of hoists and allied equipment—equipment that means years of dependability to mining men. Circle no. 39.

FOR THE MILLMAN: Four thousand installations of Hardinge mills is ample proof of company claims that Hardinge mills are backed by actual experience under operating conditions. Get the new bulletin AH-440 on the complete line of Hardinge rod, ball, tube, and batch mills by circling no 40.

MODERN PROSPECTING: The Radiac Company's B-2 magnetometer is light weight, direct reading magnet balance designed primarily for reconnaissance prospecting. Sensitivity is of the order of 40 gammas per division and the unit includes latitude and temperature compensation. For complete information, circle no. 67.

M-G HANDBOOK: For anyone using motors and generators, Allis Chalmers' new reference book is a must. In its 50 pages, it covers the uses, specifications and ratings of m-g equipment of all sizes. Get a copy by circling no. 68.

For Free Product Literature see other side

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"THIS IS MINE"

Russian apologists and United States fellow-travellers would have us believe that Communistic Socialism was a new discovery and originated with them. This is far from the truth. It was tried and failed 2,000 years ago. The Apostolic experiment was the most complete economic failure that the world has ever known until they moved the whole Christian community from Jerusalem to Caesarea Philippi before the siege of Jerusalem. It was tried again in this country during the first two years of the New England settlements. It failed again because only about one-quarter of the people had any element of leadership and the other three-quarters were leaners. For it to be a success, or much less, even workable, it must either regenerate the people or have a coercive police state.

Liberty was the chief end in the minds of our leaders. A system of government was evolved which applied the spur of necessity balanced by pride of ownership, which is the mainspring of all progress. Except for short periods of governmental folly, our economic policies have yielded the highest measure of success—the greatest good to the greatest number—that history has ever known. The ruins of socialistic experiments dot the road clear across the country. They are sign posts warning us to keep to our chosen course.

To prove our points we might write the story of one man. His name might be either John Smith or Mike Polak (under our law all men are equal). He is "true blue"—loyal American. He lives in one of the western mining states, and has worked in mines and mills. As he returns from work at the mill he may stop at the gate to look at his new house. With a swelling of his heart he may grab the gate and exclaim, "*This is mine! It is our own home!*"

Weariness or his health may make our man go prospecting in the hope of finding a mine of his own. He may be living in the state of Arizona or the state of Utah. (Please note that according to law these are also known as the Commonwealth of Arizona and the Commonwealth of Utah.) All open and unappropriated land is open to him for examination. After considerable prospecting he finds a likely prospect. He does all the things that are necessary to complete the location. He can now say, "*This claim is mine,*" so long as he keeps up the necessary assessment (rental) each year. He has claimed for himself a share in the *Common Wealth*. Surely this is real liberty!

Over the dinner-buckets our man has heard the economic claptrap that is spread by Communist fellow-travellers. Being of a studious, inquisitive mind, our man decides to study the matter for himself. He gets a couple of books from the Government in which he reads what the Communist leaders have to say about themselves and their doctrines. In the Communist Manifesto he reads, "In this sense, the theory of the Communists may be summed up in a single sentence: *Abolition of private property* . . . In a word, you reproach us with intending to do away with your property. Precisely so; that is just what we intend. . . . Abolition of family. . . . The bourgeois claptrap about family and education. About the hallowed correlation of parent and child becomes all the more disgusting, the more, by the action of modern industry." But why labor the case. There is much, much more to be used later.

No man in a Communistic country can say, "This is mine" for he owns nothing—not even his own body.

The Wanderer

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"CP" means Winslow Controlled-Pressure Elements, with an exclusive built-in system enabling *all* of your lubricating oil, *hot or cold*, to get full-flow filtration, even under *contaminated* element conditions. For this patented protection, look only to Winslow "CP" Elements.

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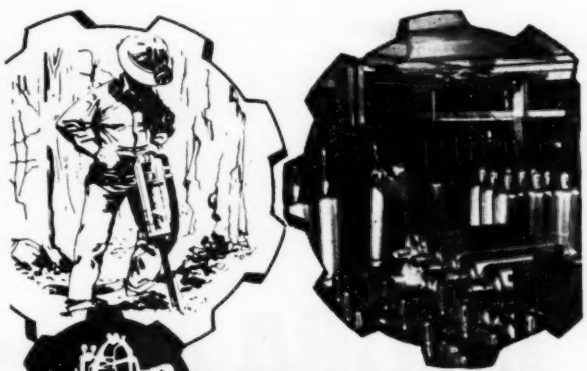

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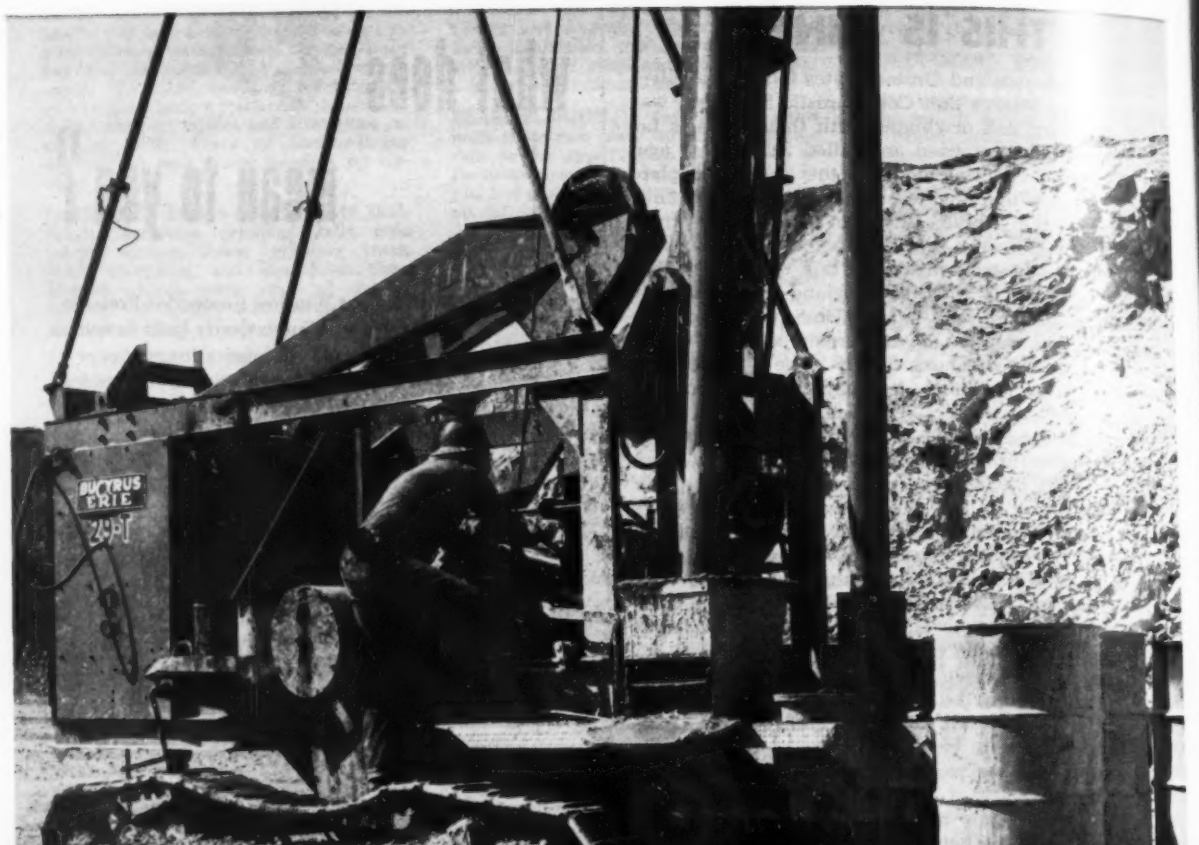

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Grinding and chewing down through as much as 55 feet of rock is a rugged task for any churn drill. That's why this blast hole machine is protected with dependable UNOBA grease.

UNOBA eliminates excessive wear because its tenacious coating cushions straining and grinding gears, helps absorb shocks.

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UNOBA is the original, multi-purpose barium-base grease. When you use UNOBA you reduce grease inventories . . . lessen the chance of using the wrong lubricant . . . save yourself time and money.

Give your equipment the dependable protection of multi-purpose UNOBA grease.

UNION OIL 76 COMPANY OF CALIFORNIA

UNOBA was developed by the makers of DRILLUBE air drill lubricant.

precipitates—CENTRAL and EASTERN

FLORIDA'S PHOSPHATE BEDS MAY BECOME NEW SOURCE OF ALUMINUM RAW MATERIAL

A potentially major source of the raw material for aluminum making has been found as a byproduct of the search for uranium. Six years ago attention was drawn to the phosphate beds of central Florida where the pebbles that form the base for fertilizer and an expanding list of chemical products lie in a buried sea beach in a long crescent extending northwest from Lake County.

The program for recovering uranium from phosphate operations is well underway in several areas. The recovery is limited entirely to the so-called wet process for making phosphates, as opposed to the furnace method. Although the actual details of the process are a secret, it is apparent that uranium recovery is achieved through treatment of the liquid phosphoric acid which is obtained by the reaction of sulphuric acid and phosphate rock. Operations along these lines, in varying degree, are underway or projected for International Minerals and Chemical Corporation, Davison Chemical Corporation, Blockson Chemical Company, and the newly organized Texas City Chemical Company.

Five major and numerous smaller developers strip the light overburden and dig the phosphate strata, which is interbedded with clay, with some of the world's largest draglines. Fertilizer makers concentrate on the easily worked pebbles, often discarding the "leached layer" of phosphate fines and impregnated clay. The leaching action is marked, due to the abundance of ground water, level terrain impeding run-off and a semi-tropical climate—conditions that in the Guianas and West Indies make for the formation of bauxite.

The overburden and other discards are dumped in the long trench-like cuts from which the pebbles have been dug, while some of the clay, agitated with water and pebbles to form a slurry, acts as a vehicle transporting the pebbles through large pipelines to the cleaning plants. Discarded here, the clay also collects in settling ponds where the surplus water is cleared before discharge into surface streams.

In 1951 engineers of the United States Atomic Energy Commission announced that their research had determined the existence of recoverable amounts of radioactive material in the leached zone clays and fines. Further studies confirmed the presence of aluminum oxide and phosphates in commercial quantities. The Al_2O_3 concentrated to better than 50 percent aluminum, equivalent to the higher grades of bauxite, while lacking certain penalizing impurities. A pilot plant was set up, in cooperation with one of the major phosphate producers, International Minerals & Chemical Corporation, in which it is reported that an economic separation of the phosphate, uranium and aluminum oxide has been attained. Pilot operations are planned to continue until the early summer of 1953, when a public announcement of the new source of aluminum oxide is expected.

Reportedly, the pilot plant staff now studies a division of reduction costs between the recovered products. By one theory, mining costs are allocated, as in the past, to the phosphate pebble production. Other formulae divide mining costs between the pebbles and the residual products, and the separation costs among the leached elements by weighted tonnage or revenue averages. Observers state that all proposals have shown the cost of the aluminum oxide at much less than that of bauxite of equal Al_2O_3 content.

Aluminum oxide from the pilot plant has been tested by the three major aluminum companies. Results to date are said to be satisfactory. Successful applicants, to whom aluminum production capacity was awarded by the Defense Production Administration in the "third round" of capacity increases authorized by the Defense Production Act of 1950, are also said to be testing the new raw material and their findings may in some cases determine the location of their new plants.

Authorities, who characterize the Florida Al_2O_3 tonnage as "fabulous" in quantity, point out that hereafter the leached zone material will be quarried with the phosphate pebbles, while the vast dumps from past working are available, with many roads and utilities still in place to lower costs of reworking. Years of life will be added to the phosphate beds.

Emergence of Florida as a major supplier of aluminum raw material may work important changes in the pattern of industry location and expectancy. National defense will be greatly aided, for in case of emergency the aluminum oxide can be shipped to any U. S. plant by rail. In the last war the sea route from the major bauxite deposits in British and Dutch Guiana was a favorite hunting ground for U-boats; over 80 ore carriers were sunk despite Allied air and sea patrols.

CCI Establishes New Iron Ore Selling Price

In view of the fact that this year labor rates in the Lake Superior iron ore industry are subject to review on July 1, the Cleveland-Cliffs Iron Company has established its selling prices for its iron ore for the second quarter of 1953, and continuing thereafter through the season unless increased labor rates after July 1 should require negotiation with its customers of a new price for the balance of the season.

On this basis, Cleveland Cliffs has sold substantial tonnages of iron ore to several steel companies at prices based on $9.70 per gross ton delivered at lower lake ports for Mesabi Range non-Bessemer ore. The new Mesabi base price, after including costs of 37 cents per ton which have hitherto been paid by the purchaser, increases the cost of ore to the purchaser 28 cents per gross ton. This increase is necessitated by the fact that the increase granted by order of the Office of Price Stabilization in 1952 was insufficient to meet increased costs of CCI's mining operations.

The new base prices, effective for ore delivered up to and including June 30, 1953 for standard grades of iron ore containing 51.50 percent natural iron, delivered at rail of vessel at lower lake ports, are as follows: Mesabi Range non-Bessemer $9.70; Mesabi Range Bessemer $9.85, old range non-Bessemer $9.95, old range Bessemer $10.10, open hearth lump $10.95.

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect on December 31, 1952, and increases or decreases after such date for buyer's account.

New Triple Superphosphate Plant in Operation

International Minerals & Chemical Corporation's large new triple superphosphate plant is now in operation about four miles west of Bartow, Florida. Extraction of uranium as a byproduct of the process will not begin until later. Planned six years, construction did not start until 1951. Cost of the project is estimated at well over $10,000,000.

Wisconsin Lead-Zinc Mine Being Reopened

Development of a lead-zinc ore body at Tennyson, Grant County, Wisconsin has been undertaken by the Piquette Mining and Milling Company of Platteville. F. B. Piquette is a partner and general manager.

An old shaft has been cleaned out and a 1,200-gpm pump installed to dewater while sinking an inclined adit. The 12-by 18-foot incline will be sunk at a 10 percent grade; when completed, the inclined length will be 1,100 feet, the first 200 feet of which will be by open cut.

Mining will be by room and pillar, and ore will be hauled to the surface in Diesel trucks for crushing at the mill. Land for the mill site has been purchased. Plans include gravity separation by jigs and a flotation unit so designed as to allow easily increased capacity from the initial 250 tons per day of mill feed.

Eagle-Picher Laboratory Will Study Germanium

The Eagle-Picher Company's new electronic laboratory under construction at Miami, Oklahoma, will concentrate on the development of germanium for industrial products. Germanium is a byproduct of smelting. Approximate cost of the project is $100,000, with operation expected to begin about June 1.

The *Mid-Continent Mining Corporation* is installing additional flotation capacity at its zinc-lead mill at West Plains, Missouri to treat HMS concentrate. Nine 56-inch Fagergren cells are being installed.

Local unions representing 3,000 zinc smelter workers in the Tri-State district decided at a recent meeting to seek the support of their United States' Congressmen and Senators in alleviating the currently unstable employment conditions in the zinc industry. Representative Edmondson of Oklahoma has already announced that he will make a personal check of conditions in northeast Oklahoma, and will request the House Small Business Committee to conduct hearings in the Tri-State area where many small marginal lead and zinc mines are shut down.

Westmoreland Manganese Corporation has resumed mining operations in Arkansas after a three-day conference with representatives of the General Services Administration during which time a solution to the firm's financial problems was worked out. Westmoreland will pay all back salaries and wages amounting to $40,000; $15,000 of this to be advanced by the government for costs of mine development already incurred by the company for which advances had not yet been made as provided in the contract. Of the remaining $25,000, half will be provided by the company, and half will be advanced by the government. Funds for the drilling program will be advanced as needed. Westmoreland's original DMPA contract was issued April 7, 1952 to produce 264,000 long tons of concentrate at the rate of 52,800 tons per year. $3,807,250 was advanced by DMPA for construction and equipping, including a HMS plant with a capacity of 6,000 tons per day.

By the end of 1952, *Fansteel Metallurgical Corporation* of North Chicago, Illinois had completed 80 percent of its expansion facilities for production of selenium rectifiers, and a related program for tantalum capacitors was well under way. Expansion of basic tungsten and molybdenum capacity was completed in 1952 with the arrival of auxiliary equipment and completion of incidental construction which increased refining capacity of tungsten by 75 percent, molybdenum by about 100 percent.

The *U.S. Bureau of Mines* has started a search for additional sources of germanium in ash pits and smoke stacks of large industrial consumers of coal. The investigation is particularly concentrated on central station power plants which burn a total of more than 100,000,000 tons of coal yearly. Germanium in the United States is presently recovered from sludges during the production of electrolytic zinc. Chief supplier is the Henryetta, Oklahoma, plant of *Eagle-Picher Company*. The germanium content of coal, like zinc, is very low. The Bureau is hunting for a standard method of determining the percentage of the element in coal ash and flue dust. Metallurgical studies of germanium are being made at Rolla, Missouri, including its recovery from zinc concentrates. Later, the Bureau plans research on cheaper germanium-recovery methods from coal products.

Milling methods common to the mineral industry are now finding application in the sand and gravel fields. The *Owatonna Cement Tile Company*, Owatonna, Minnesota, after observing similar operations on the Iron Ranges, is installing a crushing, screening, washing, and Wemco Mobil Mill at its Medford plant. The problem to be solved by using this process is the removal of shale and soft sandstone from the company's aggregate production. Magnetite will be obtained from plants on the Mesabi Range to use as medium in the process.

The *Wheland Company* of Chattanooga, Tennessee has received two certificates of necessity recently, granting rapid tax write-offs on new facilities. The most recent certification was for an alumina plant whose site has yet to be selected; 85 percent of the estimated cost of $22,160,000 has been certified. Previously Wheland had received a grant of 85 percent of a proposed $35,450,000 primary aluminum plant.

Mining and wet gravity concentrating equipment at the *Humphreys Gold Corporation's* Trail Ridge ilmenite mine east of Starke, Florida have undergone ex-

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tensive repairs and alterations. The dry mill continued to run during that period. Improved dredging equipment and new screening equipment were installed, while other equipment was repaired and placed in good operating condition.

Farmer Construction Company, mining phosphate on the C. L. Broadwell farm in Liberty Pike, Tennessee, has made its first shipment of five carloads to the *Monsanto Chemical Company's* plant in Columbia. Farmer Construction is under contract to mine for Monsanto.

The *English Mica Company's* No. 2 plant in Spruce Pine, North Carolina, was completely destroyed by a fire in March. Value of the mill which had been completely re-equipped in 1952 was estimated at $60,000.

The *Banta Mining Company, Inc.* of Detroit, Michigan is exploring for tin on the site of the late Captain S. S. Ross' old mine near Gaffney, South Carolina. *Southeastern Diamond Drilling Company* of Asheville, North Carolina is conducting the test work for Banta.

The *Foote Mineral Company* is installing a fine ore washing circuit in its spodumene mill at Kings Mountain, North Carolina. A 24-inch Wemco classifier will deslime (clay) 1¼-inch screen undersize ahead of fine crushing.

William E. Silver of Old Fort, North Carolina was the only bidder on the leasing of two acres of government land in Yancey County, North Carolina for mica production. The land is located at an intersection of the Blue Ridge Parkway and North Carolina Route 128. Action on the bid was held up by the Bureau of Land Management, however, when it was informed that a protest was to have been filed but that the individual filing it was ill.

A course in autoradiography will be given by the Oak Ridge Institute of Nuclear Studies at Oak Ridge, Tennessee from June 15 to June 25. The microscopic analysis of alpha tracks in a photographic emulsion enables one to locate and measure the amount of thorium, uranium, and other alpha-emitting elements in minerals and paleontological specimens. Although rather widely used in Europe, mineral autoradiography is relatively new in this country. Information may be obtained from the Special Training Division of the Institute at Box 117, Oak Ridge, Tennessee.

Crane Company is seeking a contract with the government to build a $26,000,000 titanium plant probably near Nashville, Tennessee. The proposed unit would produce 6,000 tons annually of titanium sponge, making it the largest producer in the country. *Titanium Metals, Inc.*,—owned by *Alleghany Ludlum Steel Corporation* and *National Lead Company*—and *E. I. du Pont de Nemours & Company* are presently the only two titanium producers. Their output last year was 992 tons.

The *Carborundum Metals Company's* new $2,500,000 zirconium plant is now under construction by the *Rust Process Design Company* of Pittsburgh at Akron, New York. Carborundum Metals, a subsidiary of the *Carborundum Company*, expects operations to begin in July 1953. A recent contract with the *U. S. Atomic Energy Commission* provides for delivery of 150,000 pounds of zirconium and hafnium (sponge) metals from the new facility each year. In zirconium processing, the zircon sands are first heat treated in an electric furnace to make carbide.

The objective for this new potash plant was AS NEARLY AUTOMATIC OPERATION AS POSSIBLE, throughout every phase until the quality-controlled finished product is shipped.

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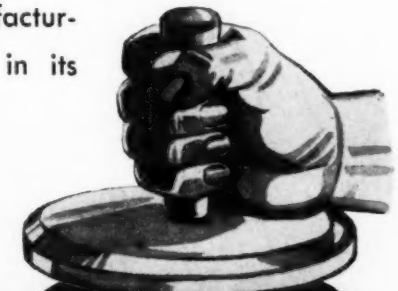

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This phase will be handled by the parent company, Carborundum. The new plant will process the carbide first into a chloride, then through purification of the zirconium chloride and final reduction of the zirconium and hafnium to sponge metal for shipments to the AEC.

Production of dry-ground mica from the district around Spruce Pine, North Carolina is presently averaging about 60,000 tons annually. This includes the output of plants using scrap and reclaimed mica produced in the district. Based on an average price of $35.00 a ton, which is believed to be low, fine mica sales from this district are now more than $2,000,000 a year. More than 1,300 people are employed in the business of mining, processing, and preparation of mica in the district which is comprised of Avery, Mitchell, and Yancey counties. There are four mica fabrication plants, one in Avery and three in Mitchell. Feldspar, kaolin, quartz sand, asbestos, and other minerals employ about 550 people in the area.

IRON RANGES

The *Coons-Pacific Company* has completed the addition of a log washing circuit to increase washing capacity before heavy media separation when treating "painty" ores. A Wemco classifier has also been added, to be operated either in parallel or in series with a classifier preparing jig feed.

The *Hanna Iron Ore Company* has recently completed the installation of a new plant at its *Hiawatha* mine near Iron River, Michigan, to be used in processing filling material for underground backfill. The plant, which is scheduled to get into full operation this spring, involves crushing, screening, and washing the surface material which is then dropped down a pipe to the working levels. The wash material is then blown by compressed air to the abandoned workings for backfilling. Jack McAuliffe is engineer in charge of operations.

It is reported that the *Oliver Iron Mining Division* plans to install a large capacity heavy media and Dutch States Mine cyclone plant in its *Gross Marble* property near Marble, Minnesota. The plant is reportedly scheduled for operation starting with the 1954 season.

M. A. Hanna Company is planning on the installation of a 250-ton-per-hour heavy media plant at its *Carlz* mine near Keewatin, Minnesota. The wash plant and auxiliary fines treatment equipment including classifiers and hydrosizers are now being installed at the property for 1953 operation. The heavy media plant is scheduled to start at the beginning of the 1954 season.

Cleveland-Cliffs Iron Company will add a second section to its *Canisteo* heavy media plant near Coleraine, Minnesota. This plant will give an added capacity of about 220 tons per hour of heavy media feed and will be ready for the 1954 ore season.

The iron ore shipping season got under way on March 29 when the first ore boats reached the Head of the Lakes. Mines started loading out of their stockpiles two or three days prior to the arrival of the first boats so that there would be ore at the docks in plenty of time to avoid boat loading delays. This is the fourth earliest opening of shipping season in recent history.

The *M. A. Hanna Company* has sold three ships operated by the Hanna Fleet for the iron ore, coal, and grain trade. The Steamer LaBelle, with a capacity of 9,600 tons, was purchased by the Kinsman Transit Company; the Steamer W. D. Crawford, with a capacity of 10,300 tons, was purchased by the Midland Steamship Line, Inc.; and the Joseph Wood, with a capacity of 9,600 tons, was purchased by the Gartland Steamship Company.

State geologists report progress in their investigations of low-grade iron ore in the Upper Peninsula of Michigan as a new source of supply for industry. After screening and processing at one mine near Michigamme, the iron content was raised from 40 to 45 percent in the original state, to 50 to 55 percent when ready for shipping. This is said to be equivalent to the natural high-grade ore found around the western end of Lake Superior. Geologists estimate that there are enough low-grade ore deposits in Michigan to produce 725,000,000 tons of blast furnace concentrates. Legislators are seeking $723,000 for research. The money would be used to build a $510,000 research center at Michigan College of Mining and Technology at Houghton, Michigan, and to launch an experimental program.

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Consolidated Coppermines Buys Old Nevada Claims

The properties of Airlanes Gold Copper Mining Company and the Table Mountain Copper Company located above Dixie Valley, 42 miles southeast of Lovelock, Nevada, reportedly have been sold to the Consolidated Coppermines Corporation of Kimberly, Nevada. Also involved in negotiations with Consolidated is Wayne Wightman of Fallon, who, together with his associates, owns property between the claims of Airlanes and Table Mountain.

Acquisition of the entire Dixie Valley copper deposit will give Consolidated between 2,000 and 2,500 claims, covering an area approximately 15 miles long and from six to eight miles wide. A crew is said to be already at work on the property, under the direction of Consolidated's chief geologist Frank Sharp.

Perishing County is reliably reported to have agreed to grade its section of the road leading to the property. It will extend from the Dodge iron ore mine to the Churchill County line, a distance of about 1¾ miles. The company is then expected to seek an easement from Churchill County.

The old *Copper Queen* mine near Bagdad, Arizona, is being operated on a 24-hour basis under three shifts by the *Cyprus Mines Corporation*. Considerable exploration work is reportedly being undertaken in conjunction with mining operations.

Huntley Industrial Minerals Inc. of Bishop, California is reported to have set up a Mica Division in Kingman, Arizona, where it will erect two new mills. One mill will be located about 28 miles south of Kingman where the mica will be mined, as well as milled. A finishing plant will be built in Kingman for finish grinding before the mica is shipped to manufacturers.

Operations of the *American Zinc, Lead and Smelting Company* at the *Hilltop* mine near Portal, Arizona are considered to be "very encouraging." Sufficient production is expected from the mine by the middle of 1953 to place it on a profitable operating basis.

About 400 tons of uraninite have been stockpiled at the *Red Bluff* property north of Globe, Arizona, owned by Mrs. Ethel Schell Larsen.

Magma Copper Company and its wholly owned subsidiary, *San Manuel Copper Corporation*, are negotiating with *Utah Construction Company* and the *Stearns-Roger Manufacturing Company* for the design and construction of a mine plant, flotation mill, smelter, and railroad near Tiger, Arizona. Magma recently purchased the properties of the *St. Anthony Mining and Development Company* at Tiger and plans to use the buildings and facilities as a temporary townsite until the company's own townsite can be erected.

Howard Mottier, lessee of the *Ash Peak* mine nine miles west of Duncan, Arizona, is producing about 1,800 tons per month of high silica silver-bearing flux. The ore, said to run about 85 percent silica with 7 to 10 ounces of silver per ton, is being mined from the 600-foot level and hoisted from the 960-foot shaft. From 20 to 22 men are employed in the work. The Ash Peak is owned by the Arthur Murphy estate, leased to the *International Smelting Refining and Mining Company*, and sub-leased to Mottier.

Work on a small scale is continuing at the *Denton* manganese property, located 12 miles west of Duncan and operated by Raymond Godfrey of Safford, Arizona. Ore from the open pit is said to run from 7 to 15 percent manganese and is concentrated by means of a small mill consisting of crusher, screens, and a jig. About one ton of concentrates per day, averaging over 40 percent manganese content, is produced.

Shaft sinking operations are being conducted by *Arizona Eastern Fluorspar Corporation* at its *Polly Ann* mine, 16 miles north of Duncan, Arizona. This work is being done under a DMEA contract with a total value of $13,850, of which the government's participation amounts to $6,925. The company's *Sydney* mine, 16 miles north of Duncan, and its *Lone Star*, 15 miles southwest of Duncan, are closed down at present, awaiting resumption of operations at the company's fluorspar mill. Morris Albertoli is superintendent.

The *Spar Mining Company*, a closed corporation, is engaged in exploration and development work on a fluorspar property located 16 miles southwest of Ft. Thomas, Arizona. L. U. Morrison of Ft. Thomas is superintendent. 145 tons have been trucked to the General Chemical Company's mill in Deming, New Mexico.

John Pursley is sub-leasing the *Scribner* mine near Elfrida, Arizona, from the *Manhattan Consolidated Mines Development Company* of Tonopah, Nevada. He is employing three men at the property and is mining and shipping two carloads of lead, gold, and silver ore monthly to the El Paso smelter of *American Smelting and Refining Company*. Mining operations are conducted from a 200-foot shaft.

A new shaft is being sunk in ore at the *Swisshelm* mine in the Swisshelm district of Cochise County, Arizona, and a depth of 40 feet has been attained. The ore is a lead carbonate with high gold-

AS&R'S NEW ZINC FUMING PLANT

American Smelting and Refining Company has placed its new zinc fuming plant in operation at Selby, California, the newest of seven such plants operating in the United States, Canada, and Mexico. Preliminary investigations at Selby had shown that an efficient recovery of zinc metal was possible from a 10 percent zinc slag produced in the lead smelter. The operation consists of blowing air and coal in measured proportions into a bath of molten zinc-bearing slag. The zinc is fumed as a metal and is combined with oxygen of the air above the bath of the furnace to produce a white zinc oxide dust. The dust is collected and combined again with a small portion of coal. This mixture is fed to a gas-fired rotary kiln where lead is removed and the shipping product densified. The 800-ton-per-month output will then be shipped to zinc smelters for recovery of the metal. Utah Construction Company erected the new facility.

silver values and occurs in irregular limestone replacements. The operator expects to ship about four carloads of ore per month to the El Paso smelter of *American Smelting and Refining Company*. The mine is owned by the *Swisshelm Gold Silver Company* and operated under lease by Bill Ward of Tombstone, Arizona. Four men are employed in shaft sinking.

The *Newmont Exploration Company*, under the direction of Malcolm McPherson, superintendent, is diamond drilling in an area about four miles directly west of Bisbee, Arizona. Three holes have been drilled, the deepest being approximately 825 feet.

The *American Copper Company* is taking over the *Sunset* mine and other properties of the *Sunset Mining Company* and the *Arizona Mining Company*, located in Pinal County, Arizona, nine miles southwest of *Magma Copper Company*. The new firm is headed by P. H. Boether of Lodi, California. The present 600-foot main shaft is to be extended to the sulphide zone with drift levels and exploration and development work on the upper levels. Present equipment is being replaced with heavier equipment.

Black Nugget Mining Corporation has been incorporated at Phoenix, Arizona with a capitalization of $20,000. Incorporators are Roy V. Waughtel of Aguila, president and director; and Norman Page and Warren J. Hoke of Los Angeles.

The *Ore Concentrating Company*, a newly incorporated subsidiary of *Salero Metals Corporation* of Patagonia, Arizona, is making plans for erection of a gravity concentrator in Texas Canyon near Dragoon, Arizona. The mill will be used for custom milling, as well as treat ore from company holdings. Water for the project will be piped from Dry Lake, a distance of 10 miles. Site of the new operation is the *Old Tungsten Placer* ground.

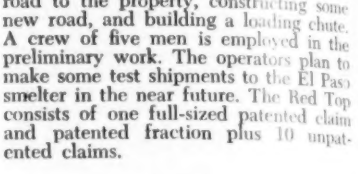
The *Denton* manganese property, located 12 miles west of Duncan, Arizona, is now under 30-day option for the purpose of exploration by the *Allison Steel Company* of Phoenix. About 4,000 tons of overburden have been removed. A face is being cut on the property, 82 feet long and 10 feet high. Previously, Raymond Godfrey had concentrated some ore by means of a small mill, consisting of crusher, screens, and a jig. About one ton of concentrates were produced per day, averaging over 40 percent manganese content.

Fred Parker and J. W. Raymond, experienced Alaskan placer miners, have leased the *Lynx Creek Placers*, eight miles east of Prescott, Arizona, and have set up a simple but effective plant for gold recovery. They are working the benches on the sides of Lynx Creek, on the lower drainage of the creek, and are handling about 1,500 yards of gravel daily. They plan to continue work as long as sufficient water is available. The plant consists of a Diesel caterpillar, pump, and sluice boxes. Parker and Raymond sampled the Lynx Creek deposits last winter, worked in Alaska during the summer, then returned to Arizona this winter and installed their plant.

Plans are reportedly under way by the *U.S. Steel Corporation* to explore iron and manganese deposits near McNary, Arizona. Iron ore is found near the western edge of Fort Apache Indian Reservation, while manganese has been located in various areas extending from Young, eastward and below Mogollon Plateau.

The *Livingston* tungsten mine, southeast of Quartzsite, Arizona, is being worked by J. R. Livingston and A. A. Barr. Equipment includes a small concentrating plant with a capacity of about 10 tons daily. They recently made a shipment of five tons of concentrates to Bishop, California, and plan to continue mining and concentrating.

The *Red Top* mine in the Mineral Hill district of Pinal County, Arizona, is being reopened by Harry E. Cassavant of Phoenix and E. N. Garlock of Apache Junction. They are rebuilding the old road to the property, constructing some new road, and building a loading chute. A crew of five men is employed in the preliminary work. The operators plan to make some test shipments to the El Paso smelter in the near future. The Red Top consists of one full-sized patented claim and patented fraction plus 10 unpatented claims.



A flash fire caused by molten magnesium alloy destroyed the foundry building of *Kaiser Magnesium Company*'s plant at Manteca, California in April. Fortunately, it did not spread to the main production building nearby. Kaiser operates the plant for the Government's General Serv-

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ies Administration. The plant was built by Kaiser during World War II at a cost of $6,000,000. It was operated for two years and then closed down. In 1951 it was reopened and now employs about 300 men on three shifts.

Because of the decline in the price of lead and zinc, *Anaconda Copper Mining Company* is reported to have closed its Tecopa, California mine and mill last month. In recent months, only development work had been carried on at Tecopa.

Central Eureka Mining Company has changed its name to *Central Eureka Corporation* because of the firm's increasing diversification. (It acquired all of the assets of the *Kaufman Meat Company* of San Jose, California last year.) The company plans to enter the sulphur mining and refining business in California and Nevada in the near future and is currently studying two deposits in undisclosed locations. Plans to develop a deposit at Sulphur, Nevada were abandoned when core drilling indicated that the size might be quite limited. Operations at the *Central Eureka* gold mine were sharply curtailed to avoid interference with a development program now underway. The Old Eureka shaft is being deepened to the 4,150-foot level, and crosscutting is progressing.

The *Royal Drift Mining Company* is ready to start mining operations at its *Royal Drift* gold mine near Paradise, California. The property has been under development for the past four years by J. W. Turner and his associates who acquired the property from the *United States Metal Corporation* under a lease and option contract. The firm has installed a 75-hp. Diesel monovalve and compressor, an electric power plant, and a mucking machine. The Royal Drift taps one of the ancient rivers, and is said to contain 1,200 acres of gold-bearing gravel, extending three miles along the ancient river channel.

Daily shipments of 1,000 tons of sulphur ore will begin during the latter part of June or early July from *Anaconda Copper Mining Company's Leviathan* mine in Alpine County, California to the new copper leaching plant at Yerington, Nevada.

The *Molybdenum Corporation of America* is installing a new 4-cell, 36-inch, Fagergren flotation machine and a 50-foot thickener at its Nipton, California rare earths mill. H. D. Bailey is superintendent.

December operations were the best of the year for *Idaho Maryland Mines Corporation* of Grass Valley, California, according to C. V. Welch, chief accountant, with an operating profit of $23,533, instead of the $23,533 expenses reported in the April issue of *Mining World*.

NEVADA

The *Garnet King Mining Company* has received a certificate of necessity authorizing fast amortization on 70 percent of $125,761 to be spent for tungsten facilities at its property in the Cocomunga mining district of Esmeralda County, Nevada.

The *Evergreen* mine has reportedly been sold by Mr. and Mrs. A. N. Marble to Ray Hines and associates. The Evergreen is a silver-lead-zinc property located almost astride the Esmeralda County line (Nevada) where the southwest portion adjoins California.

Development work at the *Mount Wheeler* tungsten property of *Combined Metals Reduction Company* in Nevada has made progress over the past year and production is expected to start shortly. *American Zinc, Lead and Smelting Company* has an interest in the operation.

Tungsten Minerals Inc., with properties in White Pine County, Nevada, reportedly has been purchased by Raymond L. Payne of Denver, Colorado, and associates. A small mill and 37 hubnerite claims are involved in the $200,000 transaction. Sellers were Dr. Rulon H. Merrill, Dr. T. E. Robinson, Clarence Reynolds, West Hammond, and Clarence Tingey, all of Salt Lake City.

A uranium deposit has been located in an old mine once worked for gold. Located about 35 miles north west of Orovada in Humboldt County, Nevada, the property has been visited by *U.S. Atomic Energy Commission* representatives who obtained ore samples. Jess Nachiando, Ervin Sweeney, and Jim Murdock of Winnemucca made the discovery.

Another uranium deposit is said to have been located about 40 miles south of Fallon, Nevada in the Rawhide mining district. Ore samples assayed by the *U.S. Bureau of Mines* in Salt Lake City reportedly showed two uranium minerals assaying 0.368 and 0.445 percent U_3O_8. George C. Coverston, A. L. Robinson, and Mr. and Mrs. O. C. Engebretson located the property.

Black Rock Mining Corporation is installing new grinding and flotation equipment at its Hiko, Nevada tungsten mill. A new Marcy 77 ball mill, 72-inch Wemco duplex classifier, and 15 2-cell, 62-inch, Fagergren flotation machines are being installed.

The *Argentite Development Corporation* has been formed in Tonopah, Nevada to develop five claims known as the *Bumblebee* in the Argentite district of Esmeralda County. Bulldozers are already at work on the property. Officials of the new firm are A. R. Wardle, president; Carroll Humphrey, vice president; and Ray Hines, secretary-treasurer. The property was purchased from Walter Ball, Thomas E. Murphy, and Howard Scott.

Fire at the main portal temporarily trapped four men working underground at the *Imperial* lead mine south of Reno, Nevada. All escaped through a recently reopened shaft. An engine house and small work shop were destroyed, but a newly built mill and laboratory were not harmed. The mine is owned by *Imperial Lead Mines, Inc.* of El Centro, California, and has been producing lead and zinc.

Nevada Sonora Mineros is making regular shipments of tungsten from the *Defense* tungsten mine near Denio, Nevada. Open-pit mining is being carried on, using a tugger to raise the ore to the surface where it can be handled. Future plans are to go underground. The property is being purchased by George Mathewson. The mill on the property of *Ashdown* gold mine, located nearby, is being used for concentration.

Dodge Brothers are reported to be shipping about 22 carloads of iron ore a day to Stockton, California, destined for shipment to Japan. Their property is in Pershing County, Nevada. Mining in the same vicinity is the *American Ore Corporation*, sending two or three cars daily to Chicago district steel plants.

NEW MEXICO

The offices of the *New Mexico Mining Association* have been moved from Albuquerque to Carlsbad. The new address is 102 West Fox Street. Denton L. Morrow is acting secretary.

Workers at the *United States Smelting Refining and Mining Company* property in Silver City, New Mexico voluntarily took a 20 percent wage cut to keep the property in operation during the present critical situation in the lead and zinc industry. The Grant County Miners Association, representing 175 workers, said that mine management had agreed to restore the former pay scale when rising prices would justify such action. The mine is reported to be the only zinc mine in the area still operating. More than 700 workers in the area had been laid off because low metal prices had made mining in Grant County unprofitable.

The *National Farmers Union*, which has under lease or option some 17,000 acres of potash bearing mineral land in New Mexico, reports that its operation is rapidly approaching the production stage. By this, the Union is said to mean that its core drilling has been satisfactory and work may soon start on construction of mine shafts, crusher plants, and refining and storage buildings. The Union may not actually mine the property itself; several groups are reported to be interested in development of the Union's holdings.

Shipments are being made from the *Pelican* group of claims at Hermosa, New Mexico, operated by George Koepke and H. B. Jones. Ore shipped carried silver as the most valuable component, averaging about 230 ounces per ton. Also included was some gold, lead, and copper.

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TELLURIDE MINES ENLARGES PANDORA MILL, INSTALLS COPPER RECOVERY UNIT

Telluride Mines Inc. is completing an expansion program at its gravity-flotation gold-silver-lead-zinc mill at Pandora, San Miguel County, Colorado. Daily capacity is being raised from 600 to 850 tons per day and for the first time copper will be recovered in a new flotation circuit. Telluride operates the famous Smuggler Union mine and in recent years has mined an important tonnage of ore from the Montana vein of the Tomboy mine.

New equipment includes a Marcy 76 ball mill, V-belt-driven by a 250-hp. Westinghouse electric motor. Ball mill discharge flows to a 42-inch Pan American jig, making a concentrate which is fed to a 16- by 20-inch Bendelari jig. This concentrate is amalgamated to recover the free gold in a Denver 36- by 48-inch batch amalgamator. Pan American jig tailing is fed to a Dorr classifier in circuit with the ball mill. Bendeleri tailing is fed to a No. 12 Wilfley table, which makes a gold-bearing concentrate going to the amalgamator, and a high-grade lead concentrate which is shipped to the smelter. Tailing goes to the classifier.

In the new lead flotation circuit, four 36-inch Agitair rougher cells make a concentrate which is cleaned in two 18-inch Denver cells, which, in turn, is recleaned in a six-cell 18-inch Denver machine. Tailing from the two 18-inch Denver cleaners returns to the head of the lead circuit, and the concentrate goes to the third cell of the six-cell Denver machine. In this machine, froth from the fourth cell is counter current to third cell, fifth and sixth are counter current to the fourth, and the second to the first. First cell concentrate is thickened, filtered, and shipped to the lead smelter. Sixth cell tailing is copper concentrate.

Lead scavanger tailing (zinc feed) is series conditioned in two conditioners. Lime is added to the first under automatic regulation by a Bristol controller and Beckman pH meter. Copper sulphate is added to the second conditioner. The conditioned pulp flows to a bank of ten 36-inch Agitair cells. Four are roughers and six scavengers. Final mill tailing from the scavengers goes to the tailing pond. Rougher concentrate is cleaned by four 36-inch Agitair cleaners. Fourth cell tailing is returned to the head of the zinc circuit, while third and fourth cell concentrate is recleaned in the first and second cells to make a shipping grade zinc concentrate.

Zinc and lead concentrates are thickened separately in 12- by 20-foot thickeners, and each is filtered by a six-foot, two-disc American filter. Copper concentrate is thickened in a 6- by 12-foot thickener, and filtered by a four-foot two-disc American filter.

Uranium Claims Dispute Comes To Standstill

The complicated dispute concerning Colorado Plateau uranium claims and government oil and gas leases apparently has come to a complete standstill, with those involved awaiting passage of clarifying legislation by Congress.

Latest development in the year-old conflict is suspension of all action by the Interior Department which might invalidate titles to mining claims staked on lands leased to oil and gas interests.

The difficulty began when it was discovered that the U. S. Atomic Energy Commission was issuing mining leases on public lands already withdrawn for other purposes. In line with the general policy of giving the uranium exploration program top priority, a solution was worked out whereby uranium miners could continue operation on oil and gas lands if the two activities did not conflict. The dispute then shifted to the specific terms of the uranium contract, with the Uranium Ore Producers Association attempting to secure full mineral rights to these claims, and the AEC wishing to grant full working, but not full legal rights. An additional complication arose very recently when it was found that, in some cases, conflicting withdrawal grants on the same lands had been issued to both the AEC and the Bureau of Land Reclamation.

The *American Smelting and Refining Company* has sunk its new Irene shaft to 1,000-foot level of the *Eclipse* mine workings on Johnny Hill, Lake County, Colorado. This new vertical shaft was started in September 1952, sunk 290 feet during 1952, was 524 feet deep on February 1, and holed through to the existing workings at the top of the 650-foot-deep Irene winze in the first week in April. J. C. Mitchell, of Leadville is superintendent of ASARCO's Leadville district mining and development operations.

Newmont Exploration Company has opened a branch office and warehouse at Montrose, Colorado which will be directed by Don Hargrove. In its recently issued annual report, Newmont listed tons mined as 259,543 during 1952 at its Colorado subsidiary, *Idarado Mining Company*. This compares with 251,634 tons in 1951 and 231,250 in 1950. Due to the fall in lead-zinc prices, net profit dropped to $546,691 as compared with $640,133 in 1951 and $862,377 in 1950. The report said that exploration begun at the Ute and Ulay vein in Hinsdale County in early 1953 was speculative, but that it might lead to development of a moderate tonnage mineable in time of "fairly good" lead-zinc prices. Tonnage for Newmont's other Colorado subsidiary, *Resurrection Mining Company*, was listed as 203,417 during 1952 as compared with 181,045 in 1951 and 154,850 in 1950. The lead-zinc price drop forced this company to declare an operating loss of $160,175. The report said that the operation was being kept open essentially to develop the remainder of the former bonanza camp at "a more reasonable cost."

Members of the Uranium Ore Producers Association are being asked to authorize processing mills to deduct 15 cents per ton on ore shipments to pay their dues to the UOPA. UOPA initiated the action, and the reaction of the shippers and mills to the proposal is not known. The AEC has refused to take a stand.

Reports from the Montezuma district in Summit County, Colorado indicate

Recent DMEA-Company Mineral Exploration Contracts In Colorado and Utah as of March 31, 1953

Company	*Home Office*	*County Where Proj. Planned*	*Metal or Mineral*	*Gov't Share of Cost*	*Private Share of Cost*
		COLORADO			
Vasco Tungsten Corp.	Boulder	Boulder	Tungsten	$13,125	$4,375
Gateway Min. & Dvp. Co.	Grand Junction	Mesa	Uranium	46,772.10	5,196.90
Utze Lode Co.	Salida	Chaffee	Lead-zinc	24,750	24,750
Empire Min. & Eng. Co.	Boulder	Boulder	Fluorspar	2,712.50	2,712.50
Defender Mining Co.	Enid, Okla.	Custer	Lead-zinc	2,390.80	2,390.80
Robitsch & Wm. Brewster	Boulder	Ouray	Tungsten	7,237.50	2,412.50
S. E. & W. E. Burleson	Salida	Saguache	Lead-zinc	13,300	13,300
Uranium Dvp. Corp.	Denver	Montrose	Uranium	19,570	2,174.45
J. L. McBroom & L. R. Allen	Boulder	Boulder	Tungsten	9,450	3,150
W. L. Weaver	Silt	Garfield	Uranium	1,800	200
Gold Bar Mines, Inc.	Idaho Springs	Clear Creek	Uranium	6,984	776
		UTAH			
Ellihill Mining Co.	White Canyon	San Juan	Uranium	17,145	1,905
Fred Staats	Salt Lake City	Beaver	Fluorspar-uranium	17,500	7,500
Salina Min. & Smelt. Co.	Compton, Calif.	Kane	Uranium	15,255.45	1,695.05
Boomerang Mining Co.	Gateway, Colo.	Grand	Uranium	21,705.84	2,411.76
Moreno Cripple Creek Corp.	Denver, Colo.	San Juan	Uranium	19,260	2,140
Glenn Mining Co.	Moroni	Piute	Uranium	20,875.50	2,319.50
U.S. Smelting, Refining & Mining Co.	Salt Lake City	Salt Lake	Copper-lead-zinc	74,762.50	74,762.50
Duke Page Auto Co.	Payson	Juab	Lead	8,853.50	8,853.50
J. G. & G. L. Shumway	Blending	San Juan	Uranium	4,050	450

that mining activity was heavier than usual during the winter. John Jeffrey and Chief Trujillo mined the *Silver King* all winter and will continue stockpiling the ore for several more months before processing it at their *Jeffrey* mill. Pat and Mike Vinson already have the *Chataqua* mill in operation, and are running the winter stockpile through as quickly as possible. Leland and Bill Sharp are working regularly on the *Chatutauqua Extension*. Buck Oelrich and a crew are working at the *Sts. John* mine, as are A. R. Rhine and crew at the *Bullion*.

The *Golconda* Mine near Idaho Springs, Colorado is being worked for pitchblende by a four-man crew under AEC contract. In the same area, a deposit of pitchblende was opened in Russell Gulch on one of the *Calhoun* claims. Authorities are at present considering whether to drive the Lucahia tunnel to the Specie Payment shaft and the Calhoun properties.

Declining prices have forced the *Callahan Lead-Zinc Company* to abandon exploration on properties adjacent to the Akron unit, which was closed in November 1952. In its annual report, the company stated that ore reserves will be mineable when the combined price reaches 30 cents, with other economic factors as they are at present.

The Black Eagle mill on Chicago Creek, Clear Creek County is being readied for handling custom ores, some of which will be from other nearby properties. The Mendota mill in Silver Plume, Colorado is operating on a recently discovered heavy lead ore.

Test diamond drilling at the Smuggler No. 2 tunnel in Aspen, Colorado has shown uranium values in the silver-lead-zinc ore, and *U. S. Atomic Energy Commission* representatives have sent some 3,000 pounds of samples to Denver for further testing. Holes from 15 to 27 feet in depth were drilled at varying angles from the tunnel for a total length of 700 feet by Herron Brothers, who have leased most of the district from the Brown and Hyman estates. Further plans will be contingent upon the results of the AEC testing and upon evolvement of a satisfactory recovery method.

The Cadwell Mining Company is expanding its development program at the *Hayden* mine and other nearby properties in the Leadville mining district, Lake County, Colorado under the direction of Superintendent Vernon C. Phillips. Ore has been found in an exploratory drift being driven southwest of the shaft, and ore gas has also been cut in a diamond drill hole below this level. Plans are underway to determine the limits of the ore before stoping. Shipments of mill-grade base metal ore from the Hayden have been shipped to the custom milling unit of the *Resurrection Mining Company* at California Gulch two miles southwest of Leadville.

Minerals Engineering Company of Grand Junction, Colorado has received a contract from the U. S. Atomic Energy Commission for 40,000 to 75,000 feet of diamond drilling in the southwest La Sal Mountains area of San Juan County, Utah. Minerals Engineering is already operating 33 diamond drills for the AEC and the U. S. Geological Survey in various parts of the Colorado Plateau.

United Park City Mines has been offered the opportunity to buy control of *Silver King Western Mining & Milling Company*, provided that not less than $150,000 is spent on exploration and development. The offer was made to *Silver King Consolidation Mines Company*, due to merge May 5 upon approval of stockholders with *Park Utah Consolidated Mines Company* to form United Park City. Selling price of the interest in Silver King Western, which has properties in the same Park City, Utah area as the merging firms, is $784,000. *Kearns Corporation* of Salt Lake City now owns the stock. If United Park City stockholders vote to buy control, it will probably be done to improve the ore reserve position, since company officials do not plan to reopen until lead-zinc prices have risen a few cents.

The U. S. Atomic Energy Commission recently awarded a diamond drilling contract to *Boyles Brothers Drilling Company* of Salt Lake City, Utah for 20,000 to 40,000 feet of drilling in the San Rafael Swell Area. The exploration is part of the AEC's policy of encouraging private operators to search for new uranium-vanadium sources.

Jones Core Drilling Company, of Dallas, Texas, has a crew of 12 men diamond drilling in the Happy Jack district of San Juan County, Utah. Glen Martin, superintendent, said the company will be in the area about six months carrying out the AEC-sponsored exploration program.

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Cooper & Bronson's *Happy Jack* mine is the largest in the district, and is a large uranium-copper producer. The AEC has two other drills and crews doing exploratory diamond drilling at nearby Red Canyon, site of *Anaconda Copper Mining Company* activity.

New Park Mining Company, Park City, Utah firm, has organized a new incentive program whereby miners can earn 25 percent of new profits from gross ore sales. Clark L. Wilson, vice president and general manager, said the plan takes into account all economic operating factors and is designed to make the miners acutely aware of the instability of metal prices as well as increase operating efficiency.

Vanadium Corporation of America hopes "to be able to justify" the enlargement of its uranium mill at Hite, Utah in the near future, according to D. W. Viles, VCA vice president. Mr. Viles credits the "very valuable information" gained through operation of a pilot plant for the company's reported success in recovering uranium and copper from the complex ore.

Aero Service Corporation has established a subsidiary company at Salt Lake City, Utah. The subsidiary, *Aero Service Corporation (Western)*, will compile topographic and photographic maps for western oil and mining companies.

Chief Consolidated Mining Company at Eureka, Utah made a net profit of $127,315 during 1952, as compared with a net loss of $278,267 in 1951. Cecil Fitch, Jr., vice president and general manager, reported that excellent results were obtained from development work at the 2,700-foot level of the mine, with ore from this area being of better grade than the mine's general one. He also said that a unit lease will be signed covering 2,700 acres north of the No. 1 shaft. If the venture is successful, Chief Consolidated will receive 15 percent of net profit. The company finished a total of 7,702 feet of development work during 1952, and the United States Geological Survey diamond drilled 3,111 feet on the company's *Apex Standard* property.

Kennecott Copper Corporation's electrolytic copper refinery at Garfield, Utah is now operating at top capacity. It operated at a rate of 12,000 tons monthly during the most of 1952, and is now up to 16,000 tons. In its annual report, the company also made note of a 16 percent increase in molybdenite production at the Utah Copper Division. The Utah Division mined 49,240,055 tons of copper during 1952, as compared with 46,361,176 in 1951. These tonnages comprise 54 and 53 percent, respectively, of total Kennecott production. Construction work on the Kennecott research center at the University of Utah is proceeding according to schedule, with work 20 percent complete.

A new company, *Deer Trail Mines*, was formed recently in Marysvale, Utah. Involved in the consolidation were the old *Deer Trail Mining Company, Valdalin Gold Mines Corporation, Trinity Gold Mines Corporation, Carisa Gold Mines Corporation, Rainbo Gold Mines Corporation*, and *Patrick T. Henry Development Corporation*. The company finished 1,000 feet of tunnel work during 1952, advancing the lower Deer Trail Tunnel to 4,865 feet. Plans call for continuing the tunnel an additional 2,000 feet plus allowing for 500 feet of crosscuts. John W. Wilhelm is president.

Forest H. Majors of Salt Lake City, Utah and Dick Adams of Grand Junction, Colorado have brought in diamond drilling equipment and are test drilling the *Ellihill* mining claims on the north side of White Canyon near Hite, San Juan County, Utah. The claims are owned by Joe Plosser and associates.

Naildriver Mining Company, an affiliate of *Park Utah Consolidated Mines Company*, has resumed work on its project to sink an inclined shaft to the Naildriver silver-lead-zinc orebody near Park City, Utah. A loan of $40,000 was granted to the company for this work in 1951 by the Defense Minerals Exploration Administration. The resumption will not be affected by the merger of Park Utah with *Silver King Coalition Mines Company*.

WYOMING

Approximately 230 land leases for uranium and assorted minerals have been approved by the Wyoming State Land Board. State Auditor E. T. Copenhaver said that this included most of the state land in Campbell, Converse, Sheridan, and Johnson counties.

A photomosaic map showing 11 radioactivity anomalies in the Miller Hill region of Carbon County, Wyoming is on display at branch offices of the *United States Geological Survey*, U. S. Bureau of Mines and U. S. Atomic Energy Commission.

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Pitchblende Discovery In Idaho's Crescent Mine

Radioactive ore found recently in the reopened main adit of the old Crescent mine in the silver belt of Idaho's Coeur d'Alene mining region has been assayed as pitchblende carrying ½ to 1 percent uranium. Occuring in heavy flinty quartzite containing only traces of other mineralization, the showing is narrow and the extent of the vein is not yet known. It is said to be the first pitchblende discovery at shallow depth in the district.

Under a DMEA-approved program, Bunker Hill & Sullivan Mining and Concentrating Company will spend $1,098,730 on a deep exploration program in the mine. The Crescent shaft will be deepened 2,000 feet from the present 1,200 level and lateral work will be carried on from a new 3,200-foot level. At the below sea level horizon which has proved so prolific in the silver belt, it is hoped to find downward extensions of the silver-copper-lead-zinc orebodies mined in upper levels prior to World War II. The mine had been shut down for 10 years until the new program was undertaken.

Harvey Buys Experimental Alumina Plant in Oregon

Harvey Machine Company of Torrance, California has purchased an alumina plant at Salem, Oregon from the General Services Administration for $325,000. Built during World War II as an experimental pilot plant to determine whether alumina could be made from aluminiferous clays in the area, it is expected that Harvey will continue the project.

Harvey is to spend $55,000,000 on an aluminum reduction plant at The Dalles, Oregon which will provide 54,000 short tons of aluminum per year. Production is not expected to start until 1954. Another $7,000,000 is to be spent on bauxite mining in French, British, and Dutch Guiana.

Sullivan Reduces Special High-Grade Zinc Output

Operations at Sullivan Mining Company's Sullivan electrolytic zinc reduction plant at Kellogg, Idaho have been reduced to a three-unit basis because of difficulties in obtaining concentrate. A decline in the price of lead and zinc has compelled many mines in the area to close or curtail output thereby depriving the reduction plant of its source of concentrate.

The planned cutback amounts to a 25 percent curtailment in production. The plant has been producing a 99.99 percent Special High Grade zinc at a monthly rate of 4,800 tons. The new rate will be only 3,600 tons per month. In 1952, the plant's entire capacity, 620 cells, was in operation 94.64 percent of the year.

Northwest Gypsum Company has purchased a new power shovel, and has constructed 100-ton bunkers at its gypsum property near Weiser, Idaho. Earl L. McEuen of Colfax, Washington, is president.

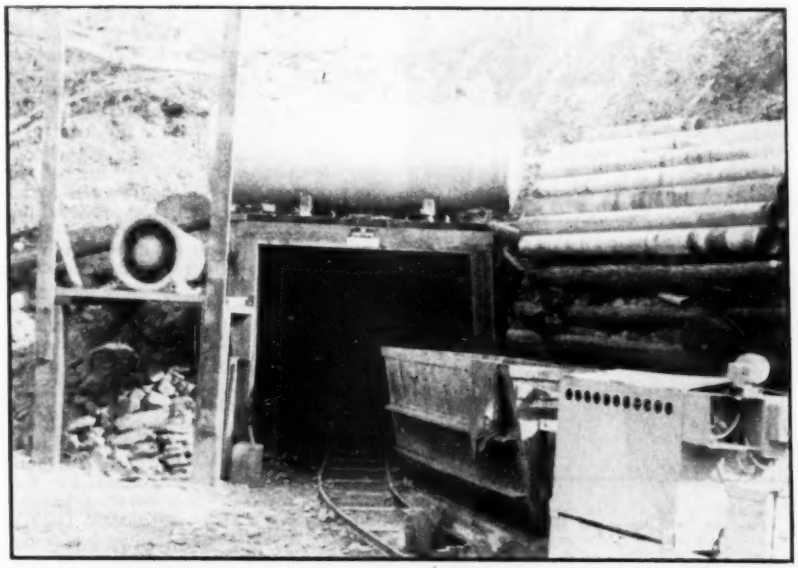
Silver Dollar Mining Company is retimbering its No. 2 offset shaft in the silver belt of the Coeur d'Alene mining district between Kelogg and Wallace, Idaho. Considerable retimbering also has been done in the main adit. R. R. Weideman is mine manager.

Callahan Zinc-Lead Company is planning some surface exploration this season at its *Vulcan Extension, Inc.* property west of Wallace, Idaho, in the Coeur d'Alene mining district. The property adjoins on the east holdings of *Vulcan Silver-Lead Company*, a subsidiary. Vulcan Silver-Lead is under development by *American Smelting & Refining Company*. Work has disclosed a silver-lead-copper mineralized zone at least 1,600 feet long and up to 1,000 feet wide on the 3,000-foot level. Joseph T. Hall of New York is president of Callahan.

Results of a U.S. Bureau of Mines' investigation of the *Hermada* antimony deposit in the Swanholm district, Elmore County, Idaho are reported in a new publication of the Bureau's Northwest mining division at Spokane. Stibnite mineralization was found to occur over an area one mile wide and two miles long in the district.

Development plans of *Sunshine Mining Company* this year at the adjacent property of *Sunshine Consolidated, Inc.*, Shoshone County, Idaho, include extending the 2,700 level at least 1,000 feet westward. Silver-lead production of Sunshine Consolidated was valued at more than $350,000 in 1952. The firm paid the $45,000 remaining indebtedness to Sunshine Mining. W. M. Yeaman of Yakima, Washington is president of Sunshine Consolidated.

Considerable zinc ore was found at *Sullivan Mining Company's Star* mine at Burke, Shoshone County, Idaho during 1952, but decreasing zinc-lead prices reduced ore reserves to 1,375,000 tons. Current assets of more than $8,000,000 as of January 1 included more than $3,000,000 in metal inventories at the Sullivan electrolytic zinc plant near Kellogg.



BUNKER-CHANCE EXPLORES FOR LEAD-ZINC

To help finance its current $152,530 DMEA lead-zinc exploration program at Wardner, Idaho, Bunker-Chance Mining Company is offering 1,000,000 shares of its stock for sale. Recent new construction includes a compressor house and miners' change room, office building, and storage quarters. Mining equipment purchased includes a mucking machine, trammer, air compressor, and five ore cars. The old Butler adit at the property has been rehabilitated and some tunneling completed. (Photograph above was taken at the adit portal.) It is planned to spend $47,500 for crosscutting and drifting, $20,078 for buildings and equipment, $6,600 for diamond drilling, and $5,821 for miscellaneous supplies. Robert M. Grammell is general manager and mining engineer in charge. T. L. Hume is company president and Milton C. Levin is secretary-treasurer.

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Day Mines, Inc. has disclosed opening of a new branching vein, the Rambler, on the 1,000-foot level of the famed *Hercules* mine at Burke, Shoshone County, Idaho.

A plane was used to fly out 150 flasks of mercury from the snowbound *United Mercury Mines'* property in the Yellow Pine district of Valley County, Idaho during the winter. The company was forced to take to the air because of *Bradley Mining Company's* closure of its *Stibnite* operations. J. J. Oberbillig of Boise, is president of United Mercury.

Hansy Copper and Gold Mines Inc., is resuming development work at its property in the St. Joe district near Adair, Idaho. Plans include drifting on a vein opened last year raising and stoping toward old upper levels. Principal values are in chalcopyrite. Sam Peterson is manager.

Federal Mining and Smelting Company has started work on a fourth compartment to the operating shaft at its *Page* mine near Kellogg in the Coeur d'Alene mining region, Idaho. The Page again ranked at the firm's leading producer in 1952. It yielded 139,973 tons of ore averaging 6.99 percent zinc, 5.77 percent lead, and 3.32 ounces of silver per ton. Federal is obtaining encouraging results in opening a branch vein at its *Morning* mine at Mullan, and is opening a new 2,400 level at its *Frisco* mine at Gem.

Sunshine Mining Company is planning a new winze at its Shoshone County property to develop the No. 8 Sunshine vein and the Chester vein on the 3,850- and 4,000-foot levels. It will be 1,400 feet east of the No. 5 winze, now being deepened from the 3,850-foot point to the 4,100 to open the main Sunshine vein at greater depth. The No. 8 vein ore body, found on the 3,400 level in 1951, was opened on the 3,250, 3,550 and 3,700 levels during 1952. From its own and neighboring properties in 1952, Sunshine produced 8,194,536 ounces of silver, 6,715,175 pounds of lead and 2,191,929 pounds of copper valued at $8,017,242. R. M. Hardy of Yakima is president.

Good milling grade silver-copper ore has been opened over a distance of more than 100 feet in the new vein found recently on the 3,000-foot level of the *Vulcan Silver-Lead* property in Lake gulch west of Wallace, Idaho. Width of the ore has been between four and five feet. J. E. Berg of Wallace, is northwest manager for *American Smelting and Refining Company*, the operating concern.

Highland-Surprise Consolidated Mining Company has completed deepening its main Surprise shaft in the Pine Creek area of Idaho from the 1,450-foot level to the 1,900 level. Opening of new 1,940 and 1,660 levels are planned but production of lead and zinc has been curtailed because of low prices for the metals. Crews are concentrating on exploration work under a $200,000 DMEA contract, and diamond drilling is already under way on the 1,300 level of the *Highland* mine.

Replacement of the secondary crusher, classifier, filter and elevators at the Golconda mill east of Wallace, Idaho has been recommended to directors of *Golconda Lead Mines* by C. E. Bloom, mill superintendent.

A vein more than 30 feet wide containing copper and gold mineralization has been opened by Mike Carney on his property 11 miles east of Grangeville, Idaho on the south fork of the Clearwater River. The showing is in an open cut.

The new chemical processing plant at the *U.S. Atomic Energy Commission's* National Reacter Testing Station, Idaho Falls, Idaho, has begun operation. The plant is designed to recover fissionable material from used reactor fuel elements. Cost of the plant, with presently planned processing facilities, is approximately $34,000,000. American Cyanamid Company is operating the plant for the government.

Jay Bettles of Wallace, Idaho has taken a lease and option on the *Crystal Cluster* and *Broken Hatchet* groups of fluorspar claims located last summer in Salmon River Canyon by Austin P. Smothers of Shoup, Idaho. Development work indicates a large tonnage of acid-grade fluorspar available 20 miles from the nearest road.

The *Buffalo* mine 32 miles southeast of Salmon, Lemhi County, Idaho, was sold March 12 to Irvin C. Porter by G. Elmo Shoup and Earl Pyeatt. According to Mr. Shoup, he and G. W. Burkman also sold their share in the lease to Mr. Porter. The new owner plans extensive development of the property, which contains gold, silver, copper, and radio-active minerals.

The *Little Pittsburg* mine of *Pine Creek Lead-Zinc Mining Company* on Pine Creek, Idaho, may be forced to shut down if the present trend in lead and zinc prices continues. The mine is operated by *Mascott Mines, Inc.* under a lease and purchase option. Ore mined and milled in 1952 totaled 19,638 tons, compared with 27,829 tons in 1951. Production in the early part of 1952 had been nearly normal, averaging about 2,400 tons mined and milled per month, but persistent price drops reduced mine operation until it is now operating at less than one-third capacity.

Eureka Silver King Mines Corporation is planning 1,000 feet of new development work this season at its property near headwaters of the South Fork of Salmon River in Idaho. Work in 1952 indicated silver-lead-gold-copper ore at four different elevations. A bridge was rebuilt and a new ventilating blower installed. John E. Dolan of Boise is president and manager.

Inspiration Lead Company Inc., of Spokane, Washington, is planning a new $100,000 exploration and development program at the *Inspiration-Silverore* properties north of Osburn, Idaho, in the Evolution mining district, Shoshone County. Work would include raising on a recently opened silver-lead showing on the main tunnel level north of the Black Cloud fault, additional drifting on the vein, about 6,600 feet of underground diamond drilling, and surface drilling, bulldozing, and trenching. W. T. Anderson of Spokane is secretary-treasurer and general manager.

Combo Mines, Inc., of Tamarack, Idaho, has been incorporated by L. K. Burno of Chicago and Jerry McCatron, Roy Nine, and Mike Dinkell of New Meadows, Idaho.

Lucky Friday Silver-Lead Mines Company is opening a new vein of high-grade silver-lead-copper ore found at a depth of 2000 feet in the western part of its mine near Mullan, Idaho. Miners have holed through a three-compartment shaft-raise from the 2,000 level to the 1,800 level, where hoisting facilities will be installed for sinking to the 2,200 horizon. John Sekulic is president and general manager.

Sunshine Mining Company has purchased 5,225,000 board feet of timber in

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the Coeur d'Alene national forest with a bid of $25,671. The timber will be used in the firm's extensive operations west of Wallace, Idaho.

Sullivan Mining Company has been carrying on preliminary work at *Silver Mountain Lead Mines* and is planning an active exploration program. The Silver Mountain group is a merger of seven properties, and has an operating agreement with Sullivan. Preliminary work includes geological mapping and bulldozer surface work involving eight miles of new road and six and one half miles of prospect trenching. J. B. Haffner of Kellogg is president of Silver Mountain.

Osburn Silver Lead Mining Company of Wallace, Idaho has been incorporated in Boise for $300,000 by Herman J. Rossi of Boise and R. G. Binyon and Robert J. Fanning of Wallace. The firm has acquired the mineral rights to the 80-acre Altermott Homestead in Shields Gulch near Osburn, adjoining the properties of *Vulcan Silver-Lead Corporation, Rainbow Mining and Milling Company, St. Elmo Silver Mines Corporation,* and *Coeur d'Alene Mines Corporation.* The property is held under lease with an option to purchase.

Lucky-Custer Mining Corporation is drifting on the Anna vein in the property of *Yankee Mines, Inc.*, on Custer Mountain, on the Yankee fork of the Salmon river near Stanley, Idaho. Lucky-Custer is leasing the 28-claim group. Frank A. Christopher and Henry Judd have the tunnel contract. Peter Scherer is company secretary.

J. R. Simplot, Idaho mining man and industrialist, has announced plans to mine high-grade silica from land leased from Lava Hot Springs Foundation near Lava Hot Springs, Idaho.

OREGON

Possible sources of radioactive minerals in Oregon are being investigated by two geologists from the *U.S. Atomic Energy Commission*—H. W. Norman and R. G. Pruett. Anyone with a radioactive mineral prospect in Oregon should contact Mr. Norman at P.O. Box 1984, Butte, Montana, and, if available, enclose a sample.

Plans are being made to start initial field work on the 230-kv. facilities that will interconnect with the California-Oregon Power Company system and also provide a power supply for the *M. A. Hanna Company's* development at Nickel Mountain near Riddle, Oregon. Bonneville Power Administration crews will spend about four to six months surveying and routing the line.

Mercury is being mined at the *Towner* mine in the Maury Mountain district of Crook County, Oregon, by Frank Towner, Jr. who is also retorting the ore.

Downward extension of scheelite veins disclosed in upper workings are sought in a mill level tunnel crosscut being driven by George, Ed, and Lewis Tulare at the *Sylvanite* mine, three miles northeast of Gold Hill, Jackson County, Oregon.

WASHINGTON

The *Oriole* lead-zinc-silver property west of Metaline Falls, Pend Oreille County, Washington, has been taken over under lease and option by Art Betchart, chief mining engineer for *Pend Oreille Mines and Metals Company*, and E. O. Dressel, Jr., Metaline Falls business man. Plans call for construction of a small portable concentrator at the property.

Low zinc-lead prices have caused *Sullivan Mining Company* to suspend development work at the Metaline district holdings of *Metaline Mining and Leasing Company* in Pend Oreille County, Washington. The Sullivan firm has spent nearly $500,000 in the last three years blocking out a substantial body of low-grade zinc-lead ore. It is jointly owned by *Bunker Hill* & Sullivan Mining and Concentrating Company and Hecla Mining Company, major operators in north Idaho's Coeur d'Alene mining region.

A. G. Lotze of Boundary, Washington, has opened a chimney of rich lead ore at a depth of 200 feet at the old *Gladstone Mountain* mine in the Northport district of Stevens County and is making shipments of crude ore to Trail, B.C., and Kellogg, Idaho. He is operating the property under lease from *Gladstone Mountain Mining Company* of Spokane.

The AIME will hold its 1953 Pacific Northwest Metals and Mineral Conference at the Benjamin Franklin Hotel in Seattle, Washington May 14, 15 and 16. Technical sessions scheduled include: Industrial Minerals, Milnor Roberts, mining engineer, chairman; Iron and Steel, James T. Gow, chief metallurgist, Electric Steel Foundry Company, Portland, Oregon, chairman; Extractive Metallurgy, Paul R. Benson, general superintendent, Tacoma copper smelter, American Smelting and Refining Company, chairman; Physical Metallurgy, W. W. Wiltschko, Aluminum Company of America, Vancouver, Washington, chairman; and Engineering Education, F. A. Forward, Department of Mining and Metallurgy, University of British Columbia, Vancouver, B.C., chairman.

Pioneer Mining Company of Colville, Washington, has started shipping lead and zinc concentrates produced in a 50-ton flotation plant it built and equipped during the past winter. Ore is coming from shallow underground workings off an inclined shaft put down on a surface outcropping from which some ore was mined by open-cut methods in 1951. The oreshoot has been opened for more than 200 feet. Concentrates are trucked 14 miles to Colville from the mine and mill in the Old Dominion mining district of Stevens County. Twelve men are employed under direction of William Koski, mine superintendent, and Warren Leidman, mill superintendent. Darrell A. Newland is company president and general manager.

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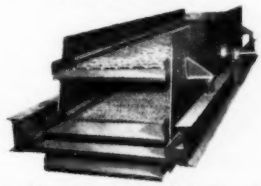

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1—12# Sweetland Filter Press, 36 leaves

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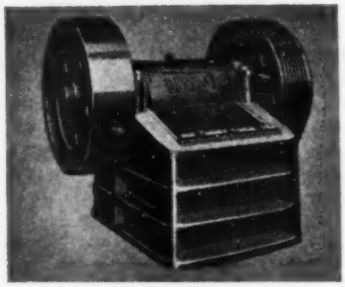

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1—9" x 15" Wheeling
1—9" x 15" Farrell
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1—8" x 24" Rogers
1—8" x 36" Universal
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1—698 CFM Union, 16" x 12"
1—800 CFM Ingersoll-Rand 18" & 11" x 16"
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1—270 CFM Sullivan driven by 6 cyl. Buda gas engine
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2—310 CFM Gardner-Denver driven by 4 cyl. Buda gas engines

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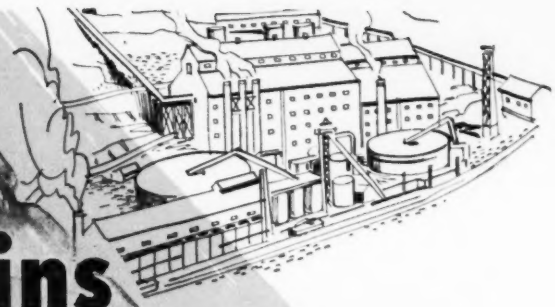

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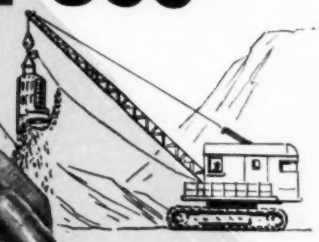

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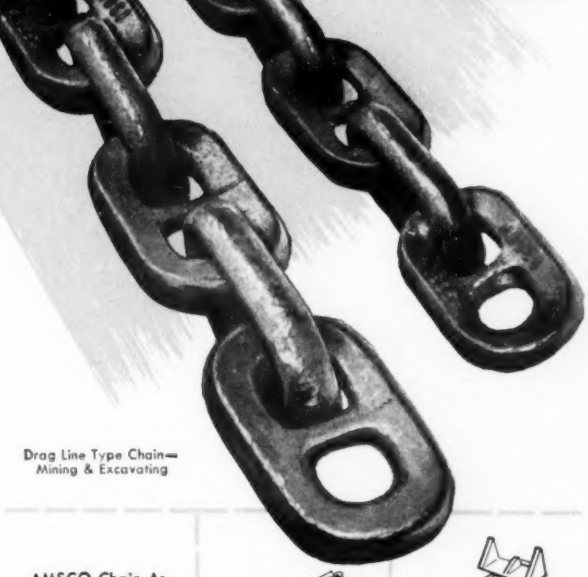

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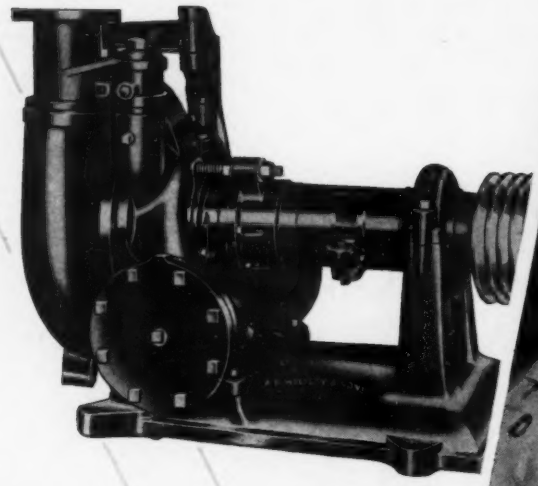

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